THIRTY-NINTH ANNUAL

REPORT

OF

Rutgers Scientific School,

THE STATE COLLEGE

FOR THE BENEFIT OF

AGRICULTURE AND THE MECHANIC ARTS,

NEW BRUNSWICK, N. J.,

FOR THE FISCAL YEAR ENDING OCTOBER 31, 1903.

CAMDEN, N. J.:
SINNICKSON CHEW & SONS COMPANY
1903

CAMPUS FRONT VIEW RUTGERS

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REPORT OF THE STATE BOARD OF VISITORS.

REPORT OF THE STATE BOARD OF VISITORS.

To His Excellency Franklin Murphy, Governor of the State of New Jersey:

Honored Sir—The Board of Visitors to the State Agricultural College herewith present their thirty-ninth annual report upon the present condition and courses of instruction at that institution, as required by the act creating the Board, entitled "An act appropriating scrip for the public lands granted to the State of New Jersey by the act of Congress approved July second, one thousand eight hundred and sixty-two," and approved April 4th, 1864.

The members of the Board made their semi-annual examinations of the students pursuing the regular courses of instruction, for the present fiscal year, on December 11th, 1902, and June 3d, 1903. They also visited the laboratories, the draughting-room, the military drill hall, the collections of the institution and the farm provided for the State Agricultural College by the Trustees of Rutgers College.

The membership of the Faculty of the College is 31, and all but 3 of this number have given instruction in the Scientific School.

The enrollment of students was 161—graduate students, 4; Seniors, 31; Juniors, 40; Sophomores, 33; Freshmen, 52; special student not candidate for a degree, 1. There were also 62 students in the classical courses and 155 pupils in attendance at the Preparatory School. The degree of Bachelor of Science was conferred upon 30 graduates in June, 1903. Of these graduates 4 had pursued the course in Agriculture, 13 the course in Civil Engineering and Mechanics, 4 the course in Chemistry, 6 the course in Electricity, 1 the course in Biology and 2 the course in Clay-Working and Ceramics.

The final examinations of the students, in the subjects pursued during the year which closed in June, 1903, were well sustained.

At the close of each of the examinations of the students and

the inspection of the buildings and facilities for instruction, the members of the Board met in formal session and reported severally upon the observations and impressions of their semi-annual visits. It was voted unanimously that the Trustees and Faculty of Rutgers College are faithfully and liberally carrying out the provisions of their contract with the State.

CONDITION AND PROGRESS.

Two buildings have been constructed during the year:

(*a*) The Ralph Voorhees Library Building, erected at a cost exceeding $60,000, the gift of Ralph Voorhees, Esq., of Clinton, N. J., designed to accommodate more than 100,000 volumes, and to furnish ample reading, study, stack, archive and lecture rooms. The outer walls are constructed of "Long Meadow" stone, and the building is practically fireproof throughout.

(*b*) The Ceramics Building, authorized by an act of the Legislature of New Jersey, approved March 17th, 1902, which appropriated $12,000 therefor, and which contains a workshop, a wet closet, a kiln, a library room, a room for collections of ceramic ware and a Director's room for instruction and for investigation.

Two additional courses of study have been established:

(*a*) A full four years-course in Clay-Working and Ceramics, leading to the degree of Bachelor of Science (B.Sc.) Two students were graduated from this course in 1903.

(*b*) A short two years' course in Ceramics, for which a certificate will be given.

The following is a list of the members of the graduating class of 1903, together with the subject of each graduate's thesis:

Daniel Herbert Applegate, Jr., "An Examination of the Physical and Chemical Properties of a New Jersey Clay."

Raymond Harman-Ashley, "The New Preparation of Sulphuric Acid."

Cortlandt Haydock Bonney, "The Construction of Roads."

Chester Timothy Brown, "A Treatise on Modern Road Construction."

William Carter, "Topography."

George Washington Conover, "A Survey and Contour Work."

David Raymond Edgar, "The Chemical and Physical Properties and Probable Commercial Uses of a Florida Clay."

Maurice Cope Engle, "Fruit Growing as a Business."

William Asbury Fisher, "A Petroleum Refinery."

Stephen Josiah Gould Francisco, "A Capillary Electrometer."

CAMPUS REAR VIEW RUTGERS

Carl Morse Herbert, "The Advisability of Constructing a Waterway Between Barnegat Bay and Manasquan Inlet."

Wright Sammis Hoag, "The Telephone Transmitter and Receiver."

Ernest Daniel Jones, "An Export Tax on Agricultural Raw Materials of National Importance."

John Earl Jones, "Topographical Surveying."

Harry Riley Lee, "Boiling Point Curves."

William Fontaine Little, "The Measurement of Alternating Currents."

Allen Sylvanus Merchant, "The Position of Nitrogen in Agriculture."

George Henry Müller, "The Pendulum."

Earle Julien Owen, "Plant Breeding in Horticulture."

Robert Haven Reineck, "The Construction of a Railroad."

Fred. Conrad Schneider, "The Construction of a Railroad."

Arthur Embury Smith, "Masonry in Construction Theory of the Arch."

Paul Strassburger, "A Sewer System for a Small Town."

William Lee Tharp, "The Rewinding of a Single Phase Induction Motor, for Use on a Two-Phase Circuit."

Theodore Tobish, "The Construction of Concrete Sewers."

Stewart Le Roy Tweed, "The Relative Merits of the Various Systems of the Several Cattle-Breeding Associations for Determining Eligibility to Advanced Registry."

John Marshall Van De Venter, "Hightstown Electric Plant."

Percy Lyle Van Nuis, "The Storage Battery."

Otto Robert Andree Voelker, "Stone Arches."

Ralph Baldwin Wilcox, "An Isolated Electric Light and Power Plant at Newark, N. J."

Appointees to State Scholarships Under Act of 1864.

Counties.	*Number of Scholarships.*	*Appointees.*
Atlantic,	1	
Bergen,	1	
Burlington,	3	George M. Hecker, '06, resident of Burlington. Thomas L. Wilkinson, '06, resident of Burlington.
Camden,	2	Ralph P. Davies, '07, resident of Middlesex. Harry J. Stockum, '07, resident of Camden.
Cape May,	1	Charles B. Lipman, '04, resident of Cape May.
Cumberland,	1	Nelson S. Moore, '06, resident of Cumberland.
Essex,	6	Robert W. Cobb, '05, resident of Essex. Harold L. Westfall, '06, resident of Essex. R. Lester Beach, '07, resident of Essex. Cleveland Perry, '07, resident of Essex. Howard S. Gies, '07, resident of Essex. Frank R. Van Sant, '07, resident of Essex.
Gloucester,	1	Elmer S. Weaver, '05, resident of Gloucester.

Counties.	*Number of Scholarships.*	*Appointees.*
Hudson,	6	Frank B. Kurtz, '05, resident of Hudson. Thomas D. Halliwell, Jr., '07, resident of Hudson. Herver S. De Groodt, '07, resident of Hudson. Edson J. Davis, '05, resident of Middlesex. George O. Smalley, '05, resident of Somerset.
Hunterdon,	1	Albert R. Johnson, Jr., '07, resident of Hunterdon.
Mercer,	2	Louis F. B. Woolston, '06, resident of Mercer. Andrew E. Sweeney, '07, resident of Mercer.
Middlesex,	2	Irving R. Valentine, '05, resident of Middlesex. Clarence G. Rolfe, '06, resident of Middlesex.
Monmouth,	2	G. Bergen Ford, '05, resident of Monmouth. Alfred C. Hicks, '07, resident of Monmouth.
Morris,	2	Adolph Brögger, '06, resident of Middlesex.
Ocean,	1	Fred K. Armstrong, '07, resident of Somerset.
Passaic,	2	George R. Koehler, '05, resident of Somerset. Henry L. Felch, '07, resident of Middlesex.
Salem,	1	Stephen C. Garrison, '04, resident of Salem.
Somerset,	1	William S. Woodruff, '07, resident of Somerset.
Sussex,	1	Frank A. Morris, '04, resident of Sussex.
Union,	2	Hervey K. Doane, '06, resident of Union. James E. Morrow, '06, resident of Union.
Warren,	1	David T. Mason, '05, resident of Somerset.

Appointees to Additional Scholarships Established by Trustees.

W. Reid Stryker, '04, resident of Somerset.
Frederick R. Mason, '05, resident of Somerset.
Albert B. Smith, '05, resident of Somerset.
Thomas A. Devan, '06, resident of Middlesex.
Percy E. Brown, '06, resident of Middlesex.
Winton H. Wilber, '06, resident of Union.
John J. Mulligan, '06, resident of Middlesex.
Bergen B. Staats, '06, resident of Monmouth.
Alan C. Plume, '07, resident of Union.
Reuben Tharp, Jr., '07, resident of Union.

Appointees to Assembly District Scholarships Under Act of 1890.

George W. Bauer, '04, Seventh Assembly District of Essex county.
John B. Brown, '04, Fifth Assembly District of Essex county.
William J. Douglas, Jr., '04, Sixth Assembly District of Essex county.
Gardner S. Driver, '04, Third Assembly District of Camden county.
George H. Gowen, First Assembly District of Essex county.
Richard Heuser, '04, Fourth Assembly District of Hudson county.
Alfred E. Hitchner, '04, First Assembly District of Cumberland county.
Harry J. Howell, '04, Assembly District of Sussex county.
Milton S. Ley, '04, Second Assembly District of Union county.
Ridgway F. Moon, '04, First Assembly District of Mercer county.
Herbert W. Moore, '04, Second Assembly District of Burlington county.
George A. Mount, '04, Third Assembly District of Monmouth county.
John I. Nelson, '04, First Assembly District of Hudson county.
Charles F. O'Neill, '04, Fourth Assembly District of Essex county.
Harold B. Osborn, '04, Third Assembly District of Hudson county.
Frederic A. Price, Jr., '04, First Assembly District of Morris county.
Warner Risley, '04, Assembly District of Cape May county.
Frederick G. C. Volkert, '04, Third Assembly District of Middlesex county.
Charles Wagner, '04, First Assembly District of Union county.
James C. Waters, Jr., '04, Third Assembly District of Union county.
Fritz C. Wittig, '04, Second Assembly District of Middlesex county.
Frank C. Woodruff, '04, Eighth Assembly District of Essex county.
Lewis M. Young, '04, Second Assembly District of Hudson county.
Harry B. Angus, '05, First Assembly District of Essex county.
Welcome W. Bender, '05, First Assembly District of Union county.
John Gaub, '05, Second Assembly District of Middlesex county.
Harry L. Harris, '05, First Assembly District of Middlesex county.
William P. Morton, '05, Assembly District of Ocean county.
Elmer J. Pearce, '05, Third Assembly District of Union county.
Loren P. Plummer, Jr., '05, Assembly District of Salem county.
William B. Roll, '05, Second Assembly District of Mercer county.
Eugene W. Seng, '05, Third Assembly District of Middlesex county.
Benjamin A. Sickles, '05, Second Assembly District of Monmouth county.
Clarence L. Smith, '05, Third Assembly District of Mercer county.
Edward H. Acton, '06, Assembly District of Salem county.
Adolph G. Ahrens, '06, First Assembly District of Union county.
Raymond W. Allen, '06, Second Assembly District of Burlington county.
George G. Ashwell, '06, Tenth Assembly District of Essex county.
Thomas H. Bruce, '06, Third Assembly District of Monmouth county.
Walter R. Cornell, '06, First Assembly District of Cumberland county.
Charles R. Duncan, '06, Second Assembly District of Essex county.
J. Langford Edwards, '06, Assembly District of Ocean county.
Charles J. Eldridge, '06, Assembly District of Gloucester county.
Harold H. Febrey, '06, Third Assembly District of Essex county.
Howard S. Gay, '06, First Assembly District of Hudson county.
Arthur V. Gregory, '06, Second Assembly District of Hudson county.
Albert W. Hill, '06, Third Assembly District of Union county.
Roy G. Imlay, '06, First Assembly District of Monmouth county.
David W. Jenkins, '06, First Assembly District of Morris county.
George H. Roeder, '06, Third Assembly District of Middlesex county.

Charles C. Armstrong, '07, Third Assembly District of Middlesex county.
Harlan Besson, '07, Tenth Assembly District of Hudson county.
Abraham Blum, '07, First Assembly District of Essex county.
Walter G. Boschen, '07, Second Assembly District of Union county.
Harry F. Brewer, '07, First Assembly District of Union county.
Randolph Creamer, '07, Assembly District of Cape May county.
Isaac Fineburg, '07, Third Assembly District of Mercer county.
Lewis A. Heath, '07, Second Assembly District of Essex county.
William R. Hughes, Jr., '07, Second Assembly District of Middlesex county.
Harris A. Jemison, '07, Third Assembly District of Monmouth county.
Edward L. Keenan, '07, Assembly District of Somerset county.
Harry A. Marmer, '07, First Assembly District of Hudson county.
Clifford D. Mayhew, '07, Assembly District of Salem county.
Walter E. Nelson, '07, First Assembly District of Middlesex county.
Alex. W. Quackenboss, '07, Third Assembly District of Essex county.
Harvey C. Robins, '07, Fourth Assembly District of Essex county.
Walter F. L. Roeder, '07, Fifth Assembly District of Essex county.
Isaac V. Slifestein, '07, Second Assembly District of Hudson county.
James H. Smith, '07, Sixtn Assembly District of Essex county.
Frank S. Stimson, '07, Second Assembly District of Union county.
Vinton D. Tompkins, '07, Third Assembly District of Mercer county.
Horace E. Treat, '07, First Assembly District of Monmouth county.
Carl W. Wilmurt, '07, Seventh Assembly District of Essex county.
Raymond P. Wilson, '07, Eighth Assembly District of Essex county.
Walter H. Wilson, '07, Ninth Assembly District of Essex county.

All of which is respectfully submitted,

D. D. DENISE,
President of Board of Visitors

REPORT OF THE BOARD OF TRUSTEES.

TRUSTEES' REPORT.

Rutgers College,
New Brunswick, November 30th, 1903.

To His Excellency Franklin Murphy, Governor of the State of New Jersey:

Honored Sir—In compliance with the act of Congress, approved July 2d, 1862, and the act of the Legislature of New Jersey, approved April 4th, 1864, I beg leave to submit, on behalf of the Trustees of Rutgers College, the thirty-ninth annual report of Rutgers Scientific School.

1. FACULTY.

Austin Scott, Ph.D., LL.D., President, and Professor of History and Political Science.

*Rev. Jacob Cooper, D.D., D.C.L., LL.D., Professor of Logic and Mental Philosophy.

Francis Cuyler Van Dyck, Ph.D., Professor of Physics and Experimental Mechanics. Dean.

Edward Albert Bowser, C.E., LL.D., Professor of Mathematics and Engineering.

Rev. Charles Edward Hart, D.D., Professor of Ethics and Evidences of Christianity.

Louis Bevier, Jr., Ph.D., Professor of the Greek Language and Literature. Secretary of the Extension Department.

Alfred Alexander Titsworth, M.Sc., C.E., Professor of Graphics and Mathematics.

Julius Nelson, Ph.D., Professor of Biology.

Byron David Halsted, S.D., Professor of Botany and Horticulture.

John Bernard Smith, D.Sc., Professor of Entomology.

Edward Burnett Voorhees, D.Sc., Professor of Agriculture. Director of the Agricultural College Experiment Station. Superintendent of the College Farm.

†Albert Huntington Chester, E.M., Ph.D., D.Sc., Professor of Chemistry and Mineralogy. Curator of the Museum.

John Charles Van Dyke, L.H.D., Professor of the History of Art.

* Died January 31st, 1904.
† Died April 13th, 1903.

Robert Woodworth Prentiss, M.Sc., Professor of Mathematics and Astronomy. Director of the Schanck Observatory.
Eliot Robertson Payson, Ph.D., Professor of the History and Art of Teaching.
Edward Luther Stevenson, Ph.D., Professor of History.
Rev. Henry Du Bois Mulford, D.D., Professor of the English Language and Literature. Rutgers College Lecturer on the English Bible.
William Hamilton Kirk, Ph.D., Professor of the Latin Language and Literature.
Samuel Ewing Smiley. LL.B., Captain Fifteenth U. S. Infantry, Professor of Military Science and Tactics.
Irving Strong Upson, A.M., Librarian and Registrar. Secretary of the Faculty.
Clarence Livingston Speyers, Ph.B., Associate Professor of Chemistry.
Edwin Bell Davis, B.L., Associate Professor of Modern Languages.
William Eugene Breazeale, M.Sc., Acting Associate Professor of Mathematics.
Edward Livingston Barbour, M.E., B.O., Instructor in Rhetoric and Elocution.
Fred Herbert Dodge, A.B., Instructor in Physical Training. Director of the Gymnasium.
Richard Morris, M.Sc., Instructor in Mathematics and Graphics.
Cullen Warner Parmelee, B.Sc., Instructor in Chemistry. Director of the Department of Clay-Working and Ceramics.
Albert Chester de Regt, A.B., Instructor in Chemistry.
Robert Wilson Neal, A.M., Instructor in English.
Arthur Hereford Wykeham George, A.B., Instructor in Mathematics.
Eugene Howard Babbitt, A.B., Instructor in German.
Frank Forrester Thompson, E.E., Instructor in Electrical Science.
Elias Howard Sellards, Ph.D., Instructor in Geology and Mineralogy.

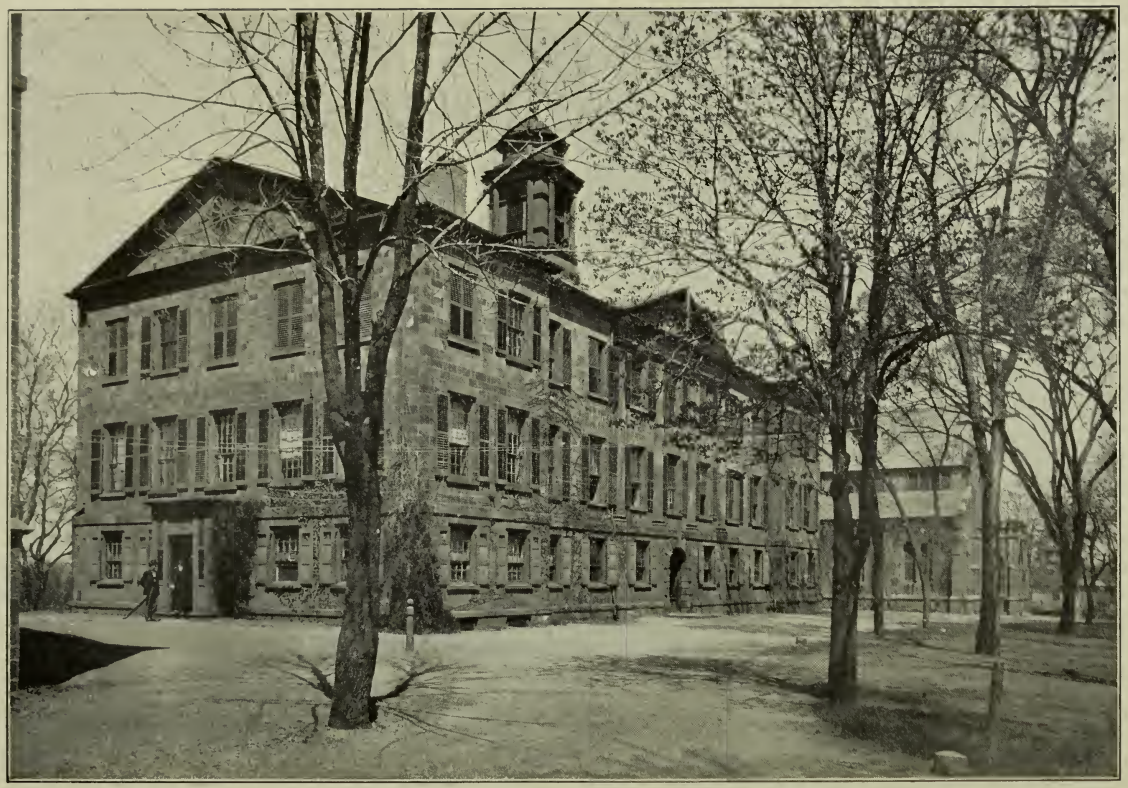
Jacob Goodale Lipman, Ph.D., Assistant in Agricultural Chemistry.
George Winfield Nuttman, M.Sc., Assistant in Biology.

The names of the Faculty, after that of the President are arranged in groups. The Professors, according to seniority of appointment; the Librarian and Registrar; the Associate Professors and Instructors, in the order of their respective appointments.

OTHER OFFICERS.

John Edward Elmendorf, A.M., Assistant to the Treasurer.
George Augustus Osborn, B.Sc., Assistant in the Library.
William Seymour Valiant, Assistant in the Geological Museum.

Clarence A. Du Bois,
John Thomas,
Cheeseman Fisher,
Francis R. Cox,
} Janitors.



QUEEN'S COLLEGE RUTGERS

2. STUDENTS.

GRADUATE STUDENTS.

Names.	*Residences.*	*Rooms.*
Daniel Herbert Applegate, Jr., B.Sc., Rutgers Scientific School. *Ceramics.*	Red Bank,	Zeta Psi House.
Howard Weston Bloomfield, B.Sc., College City of New York. *Ceramics.*	Metuchen,	Metuchen.
Edgar Leek Dickerson, B.Sc., Rutgers Scientific School. *Entomology, Botany, Chemistry.*	Newark,	Newark.
David Raymond Edgar, B.Sc., Rutgers Scientific School. *Ceramics.*	Metuchen,	Metuchen.
George Winfield Nuttman, M.Sc., Rutgers Scientific School. *Animal Morphology, Botany, Entomology.*	New Brunswick,	114 College Ave.

SENIOR CLASS.

CLASS OF 1904.

Names.	*Residences.*	*Rooms*
George Wolfe Bauer,	Elizabeth,	Chi Psi Lodge.
Fred Le Roy Brown,	White Plains, N. Y., Delta Kappa	Epsilon House.
John Brien Brown,	Newark, 14	Hertzog Hall.
William James Douglas, Jr.,	Newark, Delta	Upsilon House.
Gardner Sam Driver,	Atlantic City, 31	Hertzog Hall.
Stephen Clifton Garrison,	Elmer,	Chi Phi House.
Frederick William Gaston,	Passaic, Beta	Theta Pi House.
George Henry Gowen,	New Brunswick, 144	Paterson St.
Richard Heuser,	Matawan, 220	Suydam St.
Alfred Ellet Hitchner,	Bridgeton,	Zeta Psi House.
Harry Jay Howell,	Newton, Beta	Theta Pi House.
Milton Shortlidge Ley,	Elizabeth,	Chi Phi House.
Charles Bernhard Lipman,	Woodbine, 286	Suydam St.
John Mellor,	New Brunswick, 220	Suydam St.
Ridgway Fell Moon,	Trenton, Delta Kappa	Upsilon House.
Herbert Wills Moore,	Moorestown, 14	Hertzog Hall.
Frank Abram Morris,	Newton, Beta	Theta Pi House.
George Andrew Mount,	Atlantic Highlands, Beta	Theta Pi House.
John Irving Nelson,	New Market,	New Market.
Charles Francis O'Neill,	Newark, Delta Kappa	Epsilon House.
Harold Blackman Osborn,	New Brunswick, 222	Seaman St.
Herman Arthur Plusch,	Catskill, 12	Hertzog Hall.
Frederic Alton Price, Jr.,	Elizabeth, Beta	Theta Pi House.
Warner Risley,	Pleasantville, 33	Hertzog Hall.
Bertram Frothingham Shivler,	Troy, N. Y.,	Chi Phi House.
Whitelaw Reid Stryker,	Bound Brook,	Bound Brook.
Thomas Earle Van Winkle,	Jersey City,	Zeta Psi House.
Frederick George Carl Volkert,	New Brunswick, 79	Church St.
Charles Wagner,	Elizabeth,	Elizabeth.
James Coleman Waters, Jr.,	Rahway,	Rahway.
Fritz Carl Wittig,	New Brunswick, 16	Hardenbergh St.
Frank Carrington Woodruff,	Rahway,	Rahway.
Lewis Maxwell Young,	New Brunswick, 14	Remsen Ave.

JUNIOR CLASS.

CLASS OF 1905.

Names.	*Residences.*	*Rooms.*
Harry Baremore Angus,	Elizabeth,	Chi Phi House.
Welcome William Bender,	Elizabeth,	Elizabeth.
*Nathan Campbell,	Haledon.	
Henry de la Bruyere Carpender,	New Brunswick,	George St.
Charles William Chappel,	Warsaw, N. Y.,	25 Hertzog Hall.
Robert Weeks Cobb,	Newark,	Zeta Psi House.
Edson Joseph Davis,	New Market,	New Market.
Arthur Voorhees De Hart,	Raritan,	Delta Upsilon House.
George Bergen Ford,	Allentown,	Delta Kappa Epsilon House.
John Gaub,	New Brunswick,	134 Easton Ave.
Harry Lloyd Harris,	New Brunswick,	359 George St.
Franklyn Edward Holsten,	Brooklyn, N. Y.,	Delta Kappa Epsilon House.
Earle Harold Houghtaling,	Port Ewen, N. Y.,	Chi Psi Lodge.
George Richard Koehler,	Somerville,	Somerville.
Francis Bodo Kurtz,	Jersey City,	137 Winants Hall.
David Townsend Mason,	Bound Brook,	Chi Psi Lodge.
Frederick Ramsay Mason,	Bound Brook,	Chi Psi Lodge.
Charles Arthur Morris,	Hightstown,	Delta Upilson House.
William Paul Morton,	Salem,	Chi Phi House.
†Harold Forman Paterson,	Jersey City.	
John Elmer Pearce,	Linden,	Chi Phi House.
Loren Pease Plummer, Jr.,	Quinton,	Chi Phi House.
Dale Charles Roberts,	Alabama, N. Y.,	Gymnasium.
William Booth Roll,	Trenton,	2 High St.
Eugene William Seng,	New Brunswick,	50 Easton Ave.
Benjamin Augustus Sickles,	Colts Neck,	163 College Ave.
Albert Brokaw Smith,	Somerville,	Beta Theta Pi House.
Clarence Lockerson Smith,	Trenton,	Chi Phi House.
Irving Russell Valentine,	Woodbridge,	Zeta Psi House.
Elmer Spangler Weaver,	Williamstown,	137 Winants Hall.

*Absent with leave. †Died March 16th, 1903.

SOPHOMORE CLASS.

CLASS OF 1906.

Names.	*Residences.*	*Rooms.*
Edward Harker Acton,	Salem,	124 Winants Hall.
Adolph Geroasius Ahrens,	Elizabeth,	Elizabeth.
Raymond Walter Allen,	Medford,	11 Winants Hall.
George Guvenier Ashwell,	New Brunswick,	24 College Ave.
William Harris Benedict, Jr.,	New Brunswick,	88 Carroll Place.
Clifford Stanislaus Brinkerhoff,	Brooklyn, N. Y.,	Delta Phi House.
Adolph Brögger,	Perth Amboy,	113 Winants Hall.
Percy Edgar Brown,	Woodbridge,	Woodbridge.
Thomas Harvey Bruce,	Oceanic,	221 Seaman St.
Charles Henry Connors,	New Brunswick,	255 Baldwin St.
Walter Rodney Cornell,	Vineland,	163 College Ave.
David Alexander Decker,	Pine Bush, N. Y.,	124 Winants Hall.
Thomas Alan Devan,	New Brunswick,	131 Somerset St.
Hervey Kinch Doane,	Plainfield,	130 Winants Hall.
Charles Robert Duncan,	Newark,	Newark.
Job Langford Edwards,	Barnegat,	130 Winants Hall.
Charles Job Eldridge,	Williamstown,	134 Winants Hall.
Henry Marshall Fales, Jr.,	Buffalo, N. Y.,	11 Union St.
Harold Hooley Febrey,	Elizabeth,	113 Winants Hall.
Howard Spooner Gay,	Bayonne,	Delta Phi House.
Arthur Vaughan Gregory,	Rahway,	Rahway.
George Morley Hecker,	Riverside,	Delta Kappa Epsilon House.
Albert William Hill,	Linden,	Linden.
Arthur Headifen Howatt,	Cleveland, O.,	Beta Theta Pi House.
Roy Gordon Imlay,	Farmingdale,	31 Hertzog Hall.
David William Jenkins,	Mine Hill,	47 Hertzog Hall.
Frank Otto Mittag, Jr.,	Park Ridge,	Delta Upsilon House.
Nelson Sheppard Moore,	Bridgeton,	130 Winants Hall.
James Edwin Morrow,	Summit,	Delta Upsilon House.
John Joseph Mulligan,	Perth Amboy,	113 Winants Hall.
Frank Randall Pratt,	Warsaw, N. Y.,	172 College Ave.
George Henry Roeder,	New Brunswick,	Highland Park.
Clarence Gordon Rolfe,	New Brunswick,	101 Bayard St.
Nahum David Shore,	Boston, Mass.,	College Farm.
George Oakley Smalley,	Bound Brook,	Chi Psi Lodge.
Bergen B. Staats, Jr.,	Long Branch,	Delta Upsilon House.
Philip Vermilye Van Arsdale,	Plainfield,	45 Hertzog Hall.
Frederick Newton Wardwell,	Brooklyn, N. Y.,	Delta Kappa Epsilon House.
Russell Ellsworth Watson,	New Brunswick,	17 Hardenbergh St.
Harold Lee Westfall,	Newark,	Newark.
Winton Hadley Wilber,	Cranford,	Zeta Psi House.
Thomas Lambert Wilkinson,	Riverside,	97 Winants Hall.
Louis Frederick Baker Woolston,	Trenton,	Trenton.

FRESHMAN CLASS.

CLASS OF 1907.

Names.	*Residences.*	*Rooms.*
Charles Chambers Armstrong,	South River,	South River.
Fred Kline Armstrong,	North Plainfield,	61 Winants Hall.
Ralph Lester Beach,	East Orange,	37 Hertzog Hall.
Lester Dow Berger,	Cobleskill, N. Y.,	27 Hertzog Hall.
Harlan Besson,	Hoboken,	Delta Upsilon House.
Abraham Blum,	New Brunswick,	20 Church St.
Walter Gilbert Boschen,	Union,	Delta Kappa Epsilon House.
Harry Frank Brewer,	Elizabeth,	Chi Phi House.
Randolph Creamer,	Petersburg,	220 Suydam St.
Ralph Price Davies,	New Brunswick,	151 Somerset St.
Hervey Stanton De Groodt,	Jersey City,	99 Winants Hall.
Frank Hasbrouck Earle, Jr.,	Newark,	Zeta Psi House.
Lawrence Esselstyn,	Claverack, N. Y.,	151 Somerset St.
Henry Lange Felch,	New Brunswick,	264 Hamilton St.
Charles Burhans Finch,	Kingston, N. Y.,	Chi Psi Lodge.
Isaac Fineburg,	Trenton,	Trenton.
Charles Henry Garretson,	Somerville,	Somerville.
Howard Somerville Gies,	Newark,	37 Hertzog Hall.
J. M. Gonzalez,	San Juan, Porto Rico,	16 Winants Hall.
Thomas Dean Halliwell, Jr.,	Jersey City,	Zeta Psi House.
Lewis Arthur Heath,	New Brunswick,	342 George St.
Max Hemmer, Jr.,	Newark,	Delta Kappa Epsilon House.
Alfred Charles Hicks,	Long Branch,	Delta Upsilon House.
William Richard Hughes, Jr.,	New Brunswick,	282 Redmond St.
Harris Allison Jemison,	New Brunswick,	17 Codwise Ave.
Albert Rittenhouse Johnson, Jr.,	Raven Rock,	2 High St.
Edward Louis Keenan,	Somerville,	108 Winants Hall.
Roland Henry Birdsall Landers,	Binghamton, N. Y.,	87 Winants Hall.
Francis Granger Lang,	Hornellsville, N. Y.,	Chi Psi Lodge.
Harry Aaron Marmer,	Woodbine,	140 Hamilton St.
Clifford Davidson Mayhew,	Elmer,	2 High St.
Walter Ernest Nelson,	New Market,	New Market.
Cleveland Perry,	Belleville,	63 Winants Hall.
Alan Cole Plume,	Cranford,	Cranford.
William Denton Pollock,	Richmond Hill, N.Y.,	15 Winants Hall.
Alex. William Quackenboss,	New Brunswick,	98 Albany St.
Walter Frank Reinheimer,	Warsaw, N. Y.,	Delta Kappa Epsilon House.
Harvey Clifford Robins,	Roselle,	Roselle.
Walter Frederick Ludwig Roeder,	New Brunswick,	Highland Park.
Isaac Victor Slifestein,	Woodbine,	140 Hamilton St.
James Herbert Smith,	New Brunswick,	265 Handy St.
Frank Sanford Stimson,	Linden,	Linden.

Names.	*Residences.*	*Rooms.*
Harry John Stockum,	Marlton,	221 Seaman St.
Alton P. Swan,	Brooklyn, N. Y.,	Delta Phi House.
Andrew Edward Sweeney,	Trenton,	Trenton.
Reuben Tharp, Jr.,	Rahway,	Rahway.
Vinton Douglas Tompkins,	Trenton,	2 High St.
Horace Edward Treat,	Freehold,	College Farm.
Ralph Decker Van Duzer,	Middletown, N. Y.,	108 Bayard St.
Frank Robertson Van Sant,	Newark,	Delta Kappa Epsilon House.
Theodore Romeyn Varick,	New Brunswick,	35 College Ave.
Nicholas Vreeland,	Jersey City,	Zeta Psi House.
Howard Irving Wheat,	Brooklyn, N. Y.,	Beta Theta Pi House.
Carl Wilcox Wilmurt,	New Brunswick,	111 Carroll Place.
Raymond Percy Wilson,	East Millstone,	East Millstone.
Walter Harris Wilson,	Metuchen,	Metuchen.
William Sanderson Woodruff,	Somerville,	Somerville.

SUMMARY.

Graduate Students	5
Seniors, Class of 1904	33
Juniors, Class of 1905	28
Sophomores, Class of 1906	43
Freshmen, Class of 1907	57
	166
Absent with leave	1

3. ADMISSION.

Every applicant for admission should be at least sixteen years of age, and must submit to the President proper testimonials of a good moral character. If an applicant for a Free State Scholarship he must also present to the President a certificate of appointment.

Examinations at the School.—Examinations for admission will be held on the Friday and Saturday preceding Commencement week, June 17th and 18th, 1904, beginning at 10 o'clock A. M. on Friday, in the Registrar's office. Applicants may also be examined on Monday and Tuesday, September 19th and 20th, 1904, at the same hour and place. Students are advised to be present for examination in June.

Candidates may offer themselves for preliminary examination in any of the subjects required for admission in which their teachers certify that they are prepared.

State Competitive Examinations.—Students will also be admitted to pass the State competitive examinations, which will be held in the Court House of each county on Saturday, June 4th, 1904. For the requirements of the State law, see page 25.

Only such students are admitted with conditions as are, in the opinion of the Faculty, so nearly prepared as to be able to make up all deficiencies during the first term, meanwhile maintaining a good standing in their class.

Conditioned students will have an opportunity given them to remove their entrance conditions as early as possible in the first term. It is expected that all entrance conditions will be made up before the beginning of the second term.

College Entrance Examination Board.—Rutgers has participated in the movement to secure uniform requirements for admission to the Colleges under whose auspices an Examination Board has been organized. Certificates of this Board will be accepted in both the Classical and Scientific Schools of Rutgers.

Certificates.—From certain preparatory schools of approved standing students are admitted to the Freshman Class upon the certificate of the Principal.

Admission by certificate is conditioned upon the student's proving himself able to do the full work of his class, and at any time during the Freshman year he may be dropped from the class in case his work is not satisfactory.

Upon the request of the Principal, or Board of Education, the Faculty will appoint a committee to visit any school and to report upon its condition.

The schools which shall be approved by the Faculty upon the report of the committee shall be entitled, for a period of three years, to the privilege of admission upon certificate for their students to the School for which they were prepared.

Blank forms of certificate for admission will be furnished to the Principal of an approved school upon application to the Registrar.

The pass-cards given by the Regents of the University of the State of New York, and the certificates of certain other institutions approved by the Faculty, are accepted in place of entrance examinations in the subjects which they cover.

The certificates, when properly filled out, or the pass-cards, should be forwarded to the Registrar before the day fixed for the examinations for admission in June of each year.

Advanced Standing.—Students may enter advanced classes either at the beginning of the School year or at other times, if they sustain a satisfactory examination, both on the preliminary studies and on those already passed over by the class which they propose to enter. Full equivalents will be accepted.

Special Students.—In exceptional cases students properly prepared for admission to the Freshman Class may, by special vote of the Faculty, be permitted to pursue select branches of study. Such students are required to take examinations, all work in Composition and Elocution and Military Drill with the class with which they have studied.

FREE SCHOLARSHIPS.

State Scholarships, Act of 1864.—Under this law, a certain number of students from the State of New Jersey are received into the Scientific School, and educated free of expense for tuition. These students are admitted to free scholarships on the recommendation of the Superintendent of Schools in each county after passing the required examinations. The scholarships provided by the act of 1864 are distributed among the counties in proportion to their population, as follows:

Atlantic 1	Gloucester 1	Ocean 1
Bergen 1	Hudson 6	Passaic 2
Burlington 3	Hunterdon 1	Salem 1
Camden 2	Mercer 2	Somerset 1
Cape May 1	Middlesex 2	Sussex 1
Cumberland 1	Monmouth 2	Union 2
Essex 6	Morris 2	Warren 1

THE FINE ARTS BUILDING RUTGERS

Scholarships-at-Large.—In June, 1888, the Trustees of Rutgers College provided ten additional free State scholarships.

State Scholarships, Act of 1890.—By a law passed March 31st, 1890, a number of free scholarships, one for each Assembly district for each year, is established and offered to students in all parts of the State. The candidates for these scholarships are selected as follows: A competitive examination, under the direction of the City Superintendent and the County Superintendent of Education in each county, shall be held at the County Court House in each county of the State, upon the first Saturday in June in each year. If several candidates for appointment pass the examination from the same Assembly district, all who are suitably qualified shall receive appointment to such free scholarships, excess from certain Assembly districts being counterbalanced by vacancies in other Assembly districts, provided only that the entire number of appointees shall not exceed the entire number of free scholarships created by the State.

The following are the names and addresses of the County Superintendents:

Atlantic—Samuel D. Hoffman, Atlantic City.
Bergen—John Terhune, Hackensack.
Burlington—Herman A. Stees, Beverly.
Camden—Charles S. Albertson, Magnolia.
Cape May—Aaron W. Hand, Cape May City.
Cumberland—John N. Glaspell, Bridgeton.
Essex—Elmer C. Sherman, South Orange.
Gloucester—William H. Eldridge, Williamstown.
Hudson—M. H. Kinsley, Arlington.
Hunterdon—Jason S. Hoffman, Flemington.
Mercer—A. W. Hartwell, Titusville.
Middlesex—H. Brewster Willis, New Brunswick.
Monmouth—John Enright, Freehold.
Morris—Watson B. Matthews, Dover.
Ocean—F. A. North, Toms River.
Passaic—Homer A. Wilcox, Passaic City.
Salem—J. Harry Smith, Pennsgrove.
Somerset—Rev. J. A. Mets, Somerville.
Sussex—Luther Hill, Andover.
Union—William J. Shearer, Elizabeth.
Warren—Franklin T. Atwood, Hackettstown.

Letters of inquiry to the President, or to the Registrar, will receive careful attention.

REQUIREMENTS FOR ADMISSION.

The following are the subjects in which those who wish to enter the Freshman Class of the Scientific School are examined. Since all are such as can be acquired in our best common schools, it is insisted that the preparation in them shall be thorough and complete.

1. Mathematics.

Arithmetic.—Fundamental operations; Common and Decimal Fractions; Denominate Numbers, including the Metric System; Percentage, including Interest and Discount; Proportion; Square and Cube Root.

In preparing the student for this course, it is recommended that he be drilled thoroughly in Arithmetic, as a clear understanding of its simple elementary and practical principles is essential to a good mathmetician.

Algebra through the first seventeen chapters of Bowser's College Algebra, or an equivalent.

The student should be thoroughly drilled in the Fundamental Operations, Factoring, Greatest Common Divisor, Least Common Multiple, Fractions, Equations of the First Degree with one or more unknown quantities, problems which lead to Equations of the First Degree, Involution and Evolution of Monomials and Polynomials and the Square and Cube Root of Numbers, the Theory of Exponents, Radicals, including Rationalization, properties of Quadratic Surds, Square Root of a Binomial Surd, solution of Equations containing Radicals, Quadratic Equations of one or more unknown quantities, Simultaneous Quadratic Equations, Equations of Higher Degree than the Second, which may be reduced to the Quadratic Form and then solved by the methods of solving Quadratics, Ratio and Proportion, Arithmetic, Geometric and Harmonic Progressions.

The student should form the habit of arranging his work, whether on the blackboard or on paper, in a neat and orderly manner. Special stress is laid upon the facility and accuracy of his work.

Geometry.—The whole of Plane and Solid Geometry is required, as contained in Bowser's, or an equivalent. Careful attention should be given to the "Exercises in Geometry," since much importance is attached to the student's ability to demonstrate original exercises.

2. English.

English Grammar—including spelling.

A short English Essay is also required to be written at the examination, on some theme drawn from the books announced in advance; the essay to be correct in spelling, punctuation, division into paragraphs, grammar and expression.

In June and September, 1903, 1904 and 1905, the themes will be drawn from these books, which all students who apply for admission then should have read carefully:

Shakespeare's *The Merchant of Venice;*
Shakespeare's *Julius Cæsar;*
The Sir Roger de Coverley Papers in *The Spectator;*
Goldsmith's *The Vicar of Wakefield;*
Coleridge's *The Rime of the Ancient Mariner;*
Scott's *Ivanhoe;*
Carlisle's *Essay on Burns;*
Tennyson's *The Princess;*
Lowell's *The Vision of Sir Launfal;*
George Eliot's *Silas Marner.*

The following books are set apart for examination upon subject-matter, form and structure, in 1903, 1904 and 1905:

Shakespeare's *Macbeth;*
Milton's *Lycidas, Comus, L'Allegro and Il Penseroso;*
Burke's *Speech on Conciliation with America;*
Macaulay's *Essays on Milton and Addison.*

3. History of the United States.

Candidates for admission are examined in the History of the United States, with special reference to the colonization of the several States, the forms of government which existed previous to the War for Independence, the causes and principal events of that

war, the period of the Confederation, the establishment of the Federal Constitution, with the general history subsequent to that event.

Students often lack thorough or recent preparation in this subject. A more accurate knowledge of American History has become necessary as preliminary to the systematic instruction now given on the duties and relations of American citizenship. Students must have reviewed the subject within the two years immediately preceding their application for admission.

4. Science.

Physics.—Students are required to show satisfactory acquaintance with Wells' or Cooley's Natural Philosophy, or Peck's Ganot's Physics.

Chemistry.—Such knowledge of Chemistry as may be obtained from a thorough study of Remsen's, Cooley's or Stelle's Chemistry complete. Remsen's Elements of Chemistry is recommended because Remsen's text-books are used during the course.

4. COURSES OF STUDY.

During the first year the studies of the full courses are the same, and are designed to furnish a suitable introduction to the pursuit of the higher branches in either course.

The elements of Agriculture, of Biology and of Botany are taught during the first, second and third terms, respectively. Mathematics, Draughting, English and French are taught throughout the year.

At the end of the first year, students elect to pursue one of the full courses, and for the remaining three years their studies are directed with particular reference to the choice made. Some studies which go to the equipment of the intelligent citizen, whatever his occupation, such as History, English Literature, Political Economy, Practical Ethics, Astronomy and others, are interspersed throughout the entire four years, in order that students may not only acquire a thorough preparation for their special pursuits in life, but may at the same time receive a liberal train-

ing which will fit them to discharge wisely and usefully the duties of good citizenship.

Six distinct courses of study are included in the schedule which follows:

1. A COURSE IN AGRICULTURE.
2. A COURSE IN CIVIL ENGINEERING AND MECHANICS.
3. A COURSE IN CHEMISTRY.
4. A COURSE IN ELECTRICITY.
5. A COURSE IN BIOLOGY.
6. A COURSE IN CLAY-WORKING AND CERAMICS.

In addition to the regular course in Ceramics there is also a short course of two years, which does not lead to a degree; see page 40.

Exercises in English are required throughout the entire course, as follows: Essays, two each term; Forensics, four times each term. Declamations and Extempore Speaking during the Freshman and Sophomore years and Orations and Extempore Speaking during the Junior and Senior years.

Military Drill is required of all students in the Scientific School twice each week throughout the entire course.

FRESHMAN CLASS.

Uniform Schedule for all Scientific Courses.

FIRST TERM, Thirteen Weeks.

	Hours a week.
1. FRENCH.—Fraser and Squair's Elementary French Grammar and Reader	5
2. MATHEMATICS.—Bowser's Algera, completed	5
3. PRINCIPLES OF AGRICULTURE.—Voorhees	2
4. RHETORIC.—Hill's Principles; Lectures; Essays	2
5. CIVICS	1
6. DRAUGHTING.—Practice in Use of Instruments; Geometrical Problems and Applications	4

SECOND TERM, Thirteen Weeks.

1. FRENCH.—Modern Prose; Contes et Légendes	5
2. MATHEMATICS.—Bowser's Trigonometry, Plane and Spherical	5
3. ZOOLOGY.—Dodge's "General Zoology"	2
4. ENGLISH.—Literature: Pancoast, Brooke, or Pattee; Themes; Critical Reading	4
5. DRAUGHTING.—Projections	4

THIRD TERM, Ten Weeks.

1. FRENCH.—Modern Prose: Coppée's On Rend L'Argent and Loti's Pêcheur D'Islande	5
2. MATHEMATICS.—Surveying, Carhart	5
3. BOTANY.—Gray's Revised Lessons	2
4. ENGLISH.—Literature: Pancoast, Brooke, or Pattee; Themes; Critical Reading	4
5. DRAUGHTING.—Free-hand Drawing and Perspective	4

SOPHOMORE CLASS.

Uniform Schedule for Course in Agriculture and Course in Biology.

FIRST TERM.

	Hours a week.
1. Experimental Chemistry.—Remsen's Chemical Experiments (first two months)	5
2. Blowpipe Analysis.—Landauer; Lectures (last month of term)	
3. Chemistry.—Remsen; Lectures, with Experiments	4
4. Physics.—Ganot; Lectures	3
5. German.—Edgren and Fossler's German Grammar; Easy Prose	3
6. Chemical Laboratory Practice.—Experimental Chemistry and Blowpipe Analysis	8

SECOND TERM.

1. Qualitative Analysis.—Fresenius; Lectures	5
2. Chemistry.—Remsen; Lectures, with Experiments	3
3. Physics.—Ganot; Lectures	3
4. German.—Modern Prose; sight reading	4
5. Chemical Laboratory Practice.—Qualitative Analysis	8

THIRD TERM.

1. Qualitative Analysis.—Fresenius; Lectures	5
2. Chemistry.—Organic Chemistry; Lectures, with Experiments	3
3. Physics.—Ganot; Lectures	3
4. German.—Historical Prose	4
5. Chemical Laboratory Practice.—Qualitative Analysis	8

SOPHOMORE CLASS.

Uniform Schedule for Course in Chemistry and Course in Clay-Working and Ceramics.

FIRST TERM.

	Hours a week.
1. Experimental Chemistry.—Remsen's Chemical Experiments (first two months)	2
2. Blowpipe Analysis.—Landauer; Lectures (last month of term)	
3. Mathematics.—	3
4. Chemistry.—Remsen; Lectures, with Experiments	4
5. Physics.—Ganot; Lectures	3
6. German.—Edgren and Fossler's German Grammar; Easy Prose	3
7. Chemical Laboratory Practice.—Experimental Chemistry and Blowpipe Analysis	8

SECOND TERM.

1. Qualitative Analysis.—Fresenius; Lectures	2
2. Mathematics	3
3. Chemistry.—Remsen; Lectures, with Experiments	3
4. Physics.—Ganot; Lectures	3
5. German.—Modern Prose; sight reading	4
6. Chemical Laboratory Practice.—Qualitative Analysis	8

THIRD TERM.

1. Qualitative Analysis.—Fresenius; Lectures	2
2. Mathematics	3
3. Chemistry.—Organic Chemistry; Lectures, with Experiments	3
4. Physics.—Ganot; Lectures	3
5. German.—Historical Prose	4
6. Chemical Laboratory Practice.—Qualitative Analysis	8

VAN NEST HALL RUTGERS

SOPHOMORE CLASS.

Uniform Schedule for Course in Civil Engineering and Mechanics and Course in Electricity.

FIRST TERM.

	Hours a week.
1. Descriptive Geometry.—Hall	5
2. Chemistry—Remsen; Lectures, with Experiments	4
3. Physics.—Ganot; Lectures	3
4. German.—Edgren and Fossler's German Grammar; Easy Prose	3
5. Draughting.—Projections; Lettering	4

SECOND TERM.

1. Analytic Geometry.—Bowser	5
2. Chemistry.—Remsen; Lectures, with Experiments	3
3. Physics.—Ganot; Lectures	3
4. German.—Modern Prose; sight reading	4
5. Draughting.—Projections; Intersections and Development of Surfaces, etc.	4

THIRD TERM.

1. Analytic Geometry.—Bowser, completed	5
2. Chemistry.—Organic Chemistry; Lectures, with Experiments	3
3. Physics.—Ganot; Lectures	3
4. German.—Historical Prose	4
5. Draughting.—Shades and Shadows; Linear Persepective, etc	4

JUNIOR CLASS.

Schedule for Course in Agriculture.

FIRST TERM.

	Hours a week.
1. Agriculture.—Agricultural Chemistry; Lectures	2
2. General Biology.—Parker's Lessons	3
3. Astronomy	3
4. Mental Philosophy.—Hill's Psychology; Janet's Final Causes	2
5. History.—Robinson; Emerton; Bryce; Lectures; Class Reports	5
6. Biological Laboratory Practice	4
7. Chemical Laboratory Practice	4

SECOND TERM.

1. Agriculture.—Soils and Crops	2
2. Anatomy of Invertebrates	2
3. Vegetable Histology	1
4. Mineralogy.—Dana	2
5. Logic.—Jevons'; Ryland's	2
6. History.—Robinson; Emerton; Bryce; Lectures; Class Reports	3
7. Physics.—Steam Engine and other Prime Motors	2
8. Zoological Laboratory Practice	4
9. Botanical Laboratory Practice	4
10. Military Science	1

THIRD TERM.

1. Vegetable Histology	4
2. Anatomy and Physiology of Insects	4
3. United States History	5
4. Military Science	2
5. Botanical Laboratory Practice	4
6. Entomological Laboratory Practice	2

SENIOR CLASS.

FIRST TERM.

1. Agriculture.—Manures and Manuring	4
2. Systematic Entomology	3
3. Anatomy and Histology of Vertebrates	2
4. Political Economy.—Walker and Perry; Lectures	4
5. Geology.—Dana	2
6. Zoological Laboratory Practice	4
7. Entomological Laboratory Practice	2

SECOND TERM.

1. Agriculture.—Animal Nutrition	4
2. Embryology and Mammalian Anatomy	3
3. Vegetable Physiology	2
4. Constitutional Law.—Cooley; Lectures	4
5. Geology.—Dana	2
6. Military Science	1
7. Zoological Laboratory Practice	4
8. Botanical Laboratory Practice	4

THIRD TERM.

1. Agriculture.—Breeds and Breeding	3
2. Economic Entomology	4
3. Vegetable Pathology	2
4. International Law.—Lectures	4
5. Practical Ethics	2
6. Botanical Laboratory Practice	4
7. Entomological Laboratory Practice	2
8. Thesis	.

JUNIOR CLASS.

Schedule for Course in Biology.

FIRST TERM.

	Hours a week.
1. General Biology.—Parker's Lessons	5
2. Astronomy	3
3. Mental Philosophy.—Hill's Psychology; Janet's Final Causes	2
4. History.—Robinson; Emerton; Bryce; Lectures; Class Reports	5
5. Biological Laboratory Practice	4

SECOND TERM.

1. Anatomy of Invertebrates	3
2. Vegetable Histology	2
3. Mineralogy.—Dana	2
4. Logic.—Jevons'; Ryland's	2
5. History.—Robinson; Emerton; Bryce; Lectures; Class Reports	3
6. Military Science	1
7. Zoological Laboratory Practice	4
8. Physics.—Steam Engine and other Prime Motors	1
9. Botanical Laboratory Practice	4

THIRD TERM.

1. Vegetable Histology	4
2. Anatomy and Physiology of Insects	4
3. United States History	5
4. Military Science	2
5. Botanical Laboratory Practice	4
6. Entomological Laboratory Practice	2

SENIOR CLASS.

FIRST TERM.

1. Anatomy of Histology of Vertebrates	4
2. Systematic Entomology	5
3. Political Economy.—Walker and Perry; Lectures	4
4. Geology.—Dana	2
5. Zoological Laboratory Practice	4
6. Entomological Laboratory Practice	2

SECOND TERM.

1. Embryology and Mammalian Anatomy	5
2. Vegetable Physiology	4
3. Constitutional Law.—Cooley; Lectures	4
4. Geology.—Dana	2
5. Military Science	1
6. Zoological Laboratory Practice	4
7. Botanical Laboratory Practice	4

THIRD TERM.

1. Economic Botany; Vegetable Pathology	4
2. Economic Entomology	5
3. International Law.—Lectures	4
4. Practical Ethics	2
5. Botanical Laboratory Practice	4
6. Entomological Laboratory Practice	2
7. Thesis	.

JUNIOR CLASS.

Schedule for Course in Chemistry.

FIRST TERM.

	Hours a week.
1. Quantitative Analysis—Fresenius; Cairns; Lectures	2
2. Organic Chemistry.—Remsen	3
3. Astronomy	3
4. Mental Philosophy.—Hill's Psychology; Janet's Final Causes	2
5. History.—Robinson; Emerton; Bryce; Lectures; Class Reports	5
6. Chemical Laboratory Practice.—Quantitative Analysis	8

SECOND TERM.

1. Organic Chemistry.—Remsen	4
2. Mineralogy.—Dana	2
3. Crystallography	1
4. Logic.—Jevons'; Ryland's	2
5. History.—Robinson; Emerton; Bryce; Lectures; Class Reports	3
6. Physics.—Steam Engine and other Prime Motors	2
7. Military Science	1
8. Chemical Laboratory Practice.—Quantitative Analysis	8

THIRD TERM.

1. Stoichiometry	3
2. Determinative Mineralogy	5
3. United States History	5
4. Military Science	2
5. Chemical Laboratory Practice.—Quantitative Analysis	8

SENIOR CLASS.

FIRST TERM.

1. Applied Chemistry.—Thorp; Blount and Bloxam; Lectures; Visits to Manufactories	3
2. Principles and Theories of Chemistry, with Laboratory Practice	5
3. Reports.—Recent Chemical Literature	1
4. Political Economy.—Walker and Perry; Lectures	4
5. Geology.—Dana	2
6. Chemical Laboratory Practice—Quantitative Analysis	8

SECOND TERM.

1. Applied Chemistry.—Thorp; Blount and Bloxam; Lectures; Visits to Manufactories	4
2. Principles and Theories of Chemistry, with Laboratory Practice	4
3. Reports.—Recent Chemical Literature	1
4. Constitutional Law.—Cooley; Lectures	4
5. Geology.—Dana	2
6. Military Science	1
7. Chemical Laboratory Practice.—Organic Chemistry	8

THIRD TERM.

1. Applied Chemistry.—Sadtler; Lectures; Visits to Manufactories	3
2. Principles and Theories of Chemistry, with Laboratory Practice	5
3. Reports.—Recent Chemical Literature	1
4. International Law.—Lectures	4
5. Practical Ethics	2
6. Chemical Laboratory Practice.—Organic Chemistry	8
7. Thesis	.

JUNIOR CLASS.

Schedule for Course in Electricity.

FIRST TERM.

	Hours a week.
1. Differential Calculus.—Bowser	5
2. Astronomy	3
3. Mental Philosophy.—Hill's Psychology; Janet's Final Causes	2
4. History.—Robinson; Emerton; Bryce; Lectures; Class Reports	5
5. Draughting.—Lettering and Machine Construction	4
6. Laboratory.—Physical Measusements	2

SECOND TERM.

1. Differential Calculus.—Completed; Bowser's Integral Calculus	5
2. Mineralogy.—Dana	2
3. Logic.—Jevons'; Ryland's	2
4. History.—Robinson; Emerton; Bryce; Lectures; Class Reports	3
5. Physics.—Steam Engine and other Prime Motors	2
6. Military Science	1
7. Draughting.—India Ink and Color Shading, etc	4
8. Laboratory.—Mechanics; Measurements of Power	2

THIRD TERM.

1. Integral Calculus.—Completed	5
2. Physical Problems	3
3. United States History	5
4. Military Science	2
5. Draughting.—Construction, Copying, Tracing, Blue-Print Copying	4
6. Chemistry.—Qualitative Analysis	4

SENIOR CLASS.

FIRST TERM.

1. Mechanics.—Bowser	5
2. Elementary and Practical Electricity and Magnetism	4
3. Political Economy.—Walker and Perry; Lectures	4
4. Geology.—Dana	2
5. Draughting.—Graphical Statics, with Applications	4
6. Laboratory.—Electrical Measurement	2

SECOND TERM.

1. Mechanics.—Bowser, Completed	5
2. Dynamo-Electric Machinery	4
3. Constitutional Law.—Cooley; Lectures	4
4. Geology.—Dana	2
5. Military Science	1
6. Draughting.—Machine Construction as Applied to Electricity	4
7. Laboratory.—Electrical Testing; Dynamic Machines	2

THIRD TERM.

1. Mathematical Theory of Electricity	5
2. Theory of Alternating Currents	4
3. International Law.—Lectures	4
4. Practical Ethics	2
5. Laboratory.—Dynamic Machines	2
6. Draughting.—Thesis	.

JUNIOR CLASS.

Schedule for Course in Civil Engineering and Mechanics.

FIRST TERM.

Hours a week.

1. Differential Calculus.—Bowser 5
2. Astronomy 3
3. Mental Philosophy.—Hill's Psychology; Janet's Final Causes.... 2
4. History.—Robinson; Emerton; Bryce; Lectures; Class Reports.... 5
5. Draughting.—Lettering 4

SECOND TERM.

1. Differential Calculus.—Completed; Bowser's Integral Calculus... 5
2. Mineralogy.—Dana 2
3. Logic.—Jevons'; Ryland's..... 2
4. History.—Robinson; Emerton; Bryce; Lectures; Class Reports.... 3
5. Physics.—Steam Engine and other Prime Motors..... 2
6. Military Science..... 1
7. Draughting.—Plain and Colored Topography; Machine Construction; India Ink and Color Shading, etc..... 4

THIRD TERM.

1. Integral Calculus.—Completed..... 5
2. Railroad Curves.—Carhart's Field Book..... 3
3. United States History..... 5
4. Military Science..... 2
5. Draughting.—Copying, Tracing, Blue-Print Copying, Railroad Profiles and Cross Sections; Field Work..... 4

SENIOR CLASS.

FIRST TERM.

1. Mechanics.—Bowser 5
2. Roofs and Bridges.—Bowser..... 4
3. Political Economy.—Walker and Perry; Lectures..... 4
4. Geology.—Dana 2
5. Draughting.—Graphical Statics, with Applications..... 4

SECOND TERM.

1. Mechanics.—Bowser, completed..... 5
2. Roofs and Bridges.—Completed; Bowser's Hydromechanics..... 4
3. Constitutional Law.—Cooley; Lectures..... 4
4. Geology.—Dana 2
5. Military Science..... 1
6. Draughting.—Graphical Statics, with Applications..... 4

THIRD TERM.

1. Hydromechanics.—Completed 5
2. Geodesy.—Lectures 4
3. International Law.—Lectures..... 4
4. Practical Ethics..... 2
5. Draughting.—Thesis ..... .

JUNIOR CLASS.

Schedule for Course in Clay-Working and Ceramics.

FIRST TERM.

	Hours a week.
1. Astronomy	3
2. Mental Philosophy.—Hill's Psychology; Janet's Final Causes	2
3. History.—Robinson; Emerton; Bryce; Lectures; Class Reports	5
4. Quantitative Analysis.—Fresenius; Cairns; Lectures	2
5. Ceramics.—Raw Materials	3
6. Chemical Laboratory	8

SECOND TERM.

1. Mineralogy.—Dana	2
2. Logic.—Jevons'; Ryland's	2
3. History.—Robinson; Emerton; Bryce; Lectures; Class Reports	3
4. Physics.—Steam Engine and other Prime Motors	2
5. Military Science	1
6. Ceramics.—Clay Products	4
7. Crystallography	1
8. Chemical Laboratory.—Analysis of Silicates	8

THIRD TERM.

1. United States History	5
2. Military Science	2
3. Stoichiometry	3
4. Determinative Mineralogy	5
5. Chemical Laboratory.—Analysis of Silicates	8

SENIOR CLASS.

FIRST TERM.

1. Political Economy.—Walker and Perry; Lectures	4
2. Geology.—Dana	2
3. Economic Geology	2
4. Ceramics.—Clay Products	6
5. Reports	1
6. Ceramic Laboratory	8

SECOND TERM.

1. Constitutional Law.—Cooley; Lectures	4
2. Geology.—Dana	2
3. Military Science	3
4. Economic Geology	2
5. Ceramics.—Bodies; Drying; Firing	6
6. Reports	1
7. Ceramic Laboratory	8

THIRD TERM.

1. International Law.—Lectures	4
2. Practical Ethics	2
3. Ceramics.—Glasses; Glazes; Enamels	8
4. Reports	1
5. Ceramic Laboratory	8
6. Thesis	.

FIRST YEAR.

Schedule for Two Years' Course in Ceramics.

FIRST TERM.

	Hours a week.
1. French.—Fraser and Squair's Elementary French Grammar and Reader	5
2. Mathematics	5
3. Chemistry	4
4. Civics	1
5. Draughting.—Practice in Use of Instruments; Geometrical Problems and Applications	4
6. Chemical Laboratory	4

SECOND TERM.

1. French.—Modern Prose; Contes et Legendes	5
2. Mathematics	5
3. Chemistry	3
4. Draughting	4
5. Chemical Laboratory	6

THIRD TERM.

1. French.—Daudet's Petit Chose	5
2. Chemistry	3
3. Ceramic Circulation	3
4. Chemical Laboratory	12

SECOND YEAR.

FIRST TERM.

	Hours a week.
1. German.—Edgren and Fossler's German Grammar: Easy Prose	3
2. Ceramics.—Raw Materials	5
3. Geology	2
4. Physics.—Ganot; Lectures	3
5. Chemical Laboratory	10

SECOND TERM.

1. German.—Modern Prose; Sight Reading	4
2. Ceramics.—Clay Products	5
3. Physics.—Ganot; Lectures	2
4. Geology	2
5. Chemical Laboratory	10

THIRD TERM.

1. German.—Historical Prose	4
2. Ceramics.—Clay Products	5
3. Ceramics.—Glazes	3
4. Ceramic Laboratory	10

THE DANIEL S. SCHANCK OBSERVATORY RUTGERS

5. DESCRIPTION OF THE COURSES OF STUDY.

PRESCRIBED STUDIES.

All candidates for the degree of B.Sc. pursue a certain number of subjects in common in addition to the more specialized studies of the various elective courses. The purpose is to give all who take the bachelor's degree such general training as shall make them broadly-educated and intelligent citizens. These prescribed studies may be grouped as follows:

AGRICULTURE AND THE NATURAL SCIENCES.

Agriculture is required two hours a week during the first term of the Freshman year. The aim is to give the student definite information concerning the formation and composition of soils, the growth and development of plants and animals, the transformation and uses of the various farm products, and the relation of farming to other industries.

Zoology is required in the Winter term, Freshman year, two hours weekly. Systematic Zoology in the old sense is not taught. The aim is to present, as far as the time will allow, a few of the great biological principles which are illustrated in the animal kingdom. There is, therefore, introduced considerable Physiology as well as Morphology. The student gets a practical knowledge of what is meant by anatomy, histology, development, classification, nutrition, protoplasm, differentiation, heredity, etc. For the present year Dodge's "General Zoology" is used as a text-book, supplemented by demonstrations from specimens, charts and Auzoux models.

Botany.—Students in all courses take Botany two hours a week in the third term of the Freshman year, and the ground covered is embraced by "Gray's Revised Lessons." In connection with the text-book work, each student makes drawings and descriptions of leaves, stems, roots and other parts of plants. This is followed by a thorough study of the flower from living specimens gathered in the field. The terms used in Descriptive

Botany are dwelt upon so that each member of the class becomes familiar with the methods of determining the botanical names of plants, and acquaints himself with the relationship of genera and orders. Students are taught the methods of preparing and mounting herbarium specimens, and are required to make collections of their own.

General Chemistry is taught from a text-book fully illustrated by experimental lectures, during two terms of the Sophomore year. An endeavor is made to make the student understand the sure basis of fact on which the science of Chemistry rests, and to reason for himself with these facts. He is also taught to make a careful distinction between facts and theories, and not to confound that which is proved with what which is merely speculative.

Organic Chemistry begins in the third term of Sophomore year so that students looking toward Agriculture and Biology, as well as Chemistry, can get some idea of the chemical changes connected with their prospective subjects before more detailed study comes. The general behavior of carbon in its compounds is considered, and the different classes it forms, as well as their relations, are studied so that the fundamental chemical changes concerned in the growth of plant or animal can be properly understood by students in these courses. It is continued through the first two terms of the Junior year in the Chemical Course only.

Physics.—Three hours weekly, during the entire Sophomore year, are devoted to this subject. The presentation is by lectures, covering the ground of the text-books of Ganot and Deschanel. Recitations are both oral and written, special attention being given to deduction of the general from particulars, as well as to inferences from general principles. The course is supplemented by detailed study of the physical basis of practical machinery during the first term of the Junior year.

Astronomy.—General Astronomy is taught during the first term to all the members of the Junior Class. The object of this study is to acquaint the student with the leading facts and discoveries of the new Astronomy, and to present the methods and principles of modern astronomical research. The daily recita-

tions are supplemented by lectures illustrated by photographic lantern views obtained from the principal observatories of the world.

Mineralogy is taught in the second term of the Junior year, lectures being given at each session, illustrated by specimens taken not only from the College collection, but also from the private collection of the Professor in charge.

Geology.—In the study of Geology, which occupies two terms of the Senior year, a text-book is used, but each lesson is explained in advance by a short lecture, at which time suitable specimens are exhibited.

MATHEMATICS.

During the first year all students of the Scientific School are instructed in Algebra, Trigonometry, Surveying and Draughting. Algebra is completed and the students receive field practice in Surveying sufficient to make them familiar with the uses of the compass and transit and able to determine magnetic variations.

At the beginning of the second year the student elects the course he will pursue for the remainder of his College course, and the mathematics included is applicable to such course and is mentioned in detail under the heading of those courses.

GRAPHICS.

The instruction in this department is oral and by illustration or supervision, except in Descriptive Geometry. In this subject a text-book is used in the recitation-room, while the principles there discussed are more fully illustrated by problems assigned for graphical solution in the draughting-room. When the student has acquired some facility in the use of instruments, he is taught the methods of Projections, Intersections and Developments of simple geometrical surfaces. In the Sophomore year, the course in Drawing is based on Descriptive Geometry. Besides the solution of problems in solid Geometry, the course, during the year, includes practice in Shades and Shadows and Linear Perspective, the work being all directed by mathematical principles.

During the Junior and Senior years, the aim of the instruction is to acquaint the student with some of the many applications of the principles of Drawing bearing especially on those subjects which are applicable in the course which he has elected, much stress being laid on the applications of graphical statics. The design is to prepare intelligent and ready draughtsmen, familiar with fundamental principles and methods; to give the student a safe beginning on which to grow more easily and surely into the work of the practical designer.

ENGLISH.

In the department of English the students are required in the second and third terms of the Freshman year to study the history of the English language, the history of English literature and selections of English prose and poetry. A systematic course of private reading is prescribed for examination. Essays are required throughout the entire College course; those of the Sophomore year, calling for the careful study of the best authors, are intended to give special training in literary criticism. The instruction is given through text-books, lectures and class papers, in recitations, researches and essays. The course aims to create a love for literature, train the student in the interpretation and critical study of it, and impart so much of the literature itself as will enrich his mind with the best thought and his speech with the most expressive diction of our mother tongue.

Elocution.—The aim is to develop effective delivery in forms of expression. The scope of instruction embraces Physical Culture, Respiration, Training of the Voice and cultivation of the powers by which thought is analyzed and presented in synthetic expression.

Rhetoric.—In the department of Rhetoric, begun during the Freshman year, an effort is made to teach the principles of Composition, not as laid down in mechanical rules, but as springing from psychological laws and relations. Ideas presented in accordance with various mental requirements and influences are shown to contain the true philosophy of rational and effective discourse.

Illustrative references to the Masterpieces of Oratory, and to other forms of the best English Classical Literature, are freely given. Essays are required throughout the entire course.

Extempore Speaking.—The Bussing Prizes for excellence in extempore speaking, recently founded, are designed to cultivate the habit of presenting clearly, forcibly and accurately, and in a manner to convince an audience, the facts and ideas a student has upon themes with which he may fairly be supposed to be somewhat conversant. The repeated competition for these prizes during the four years of the College course has already produced excellent effects.

MODERN LANGUAGES.

French.—French is taught five hours a week throughout the Freshman year as a required study. An accurate pronunciation is insisted on, and a knowledge of French grammar. In the second term a large amount of easy prose is read. In the third term the selections offer greater difficulties, and the literary form is studied as well as the language itself. The required course is intended to give to all a practical acquaintance with the language, wide enough to enable them to read ordinary French prose at sight.

German.—German is taught three hours a week during the first term, and four hours a week during the second and third terms of the Sophomore year as a required subject. During the first term the grammar is the main object of study, with constant practice in the translation of illustrative sentences, both from German into English and from English into German. In the second term easy German prose is read, both in set lessons and at sight, and in the third more difficult selections, with study of the literary form. It is the aim of the required course in German to give all the students a competent knowledge of the grammar, and a sufficiently large vocabulary to be able to read ordinary prose, and to pursue further study by themselves with ease.

Students who are prepared to pass the entrance examination required from the Classical Sophomores (covering one year's work), may, if the schedule permits, take the more advanced work given to that class, and are advised to do so if possible.

POLITICAL SCIENCE AND HISTORY.

Civics.—The President meets the Freshman Class during the first term one hour each week for instruction in the rights and duties of the citizen.

Political Economy.—The Senior Class, in both the Classical and Scientific Departments, receives instruction in the principles of Political Economy four hours weekly during the first term. In addition to the use of a text-book, lectures, formal and informal, are given, discussions are held, special topics are assigned to individuals for careful study, the results of which are read before the class, and essays are prepared by the class on some subject chosen by the writer from a number relating to this science.

Constitutional Law.—The Senior Class pursues the study of Constitutional Law four hours weekly during the Winter term. Cooley's Principles of Constitutional Law is used as a text-book. Lectures are read by the President before the class on the historical development of the Constitution and some of the more important decisions of the Supreme Court are analyzed, for example, those relating to the prohibition of State laws impairing the Obligation of Contracts, the Legal Tender Cases and others of importance and paramount significance. The aim is to ground all the students in a knowledge of the elements of Constitutional Law and to give a special preparation to those about to choose the profession of the law. This is particularly kept in view in assigning the subjects for the essays which accompany the other work of the term.

International Law.—This subject is taken up the last term of the Senior year. Lectures are given by the President four hours weekly. The peculiar character of this branch of law is dwelt upon, its development, the authorities and sources, and its present status.

History.—For students in the Scientific School the study of History is begun in the Junior year with the use of a text-book as a guide. The course embraces a study of European history from the fall of the Empire to the outbreak of the French Revolution.

The method of instruction is to some extent topical, and aims to furnish information essential to good citizenship, to cultivate a habit of investigation and to teach the student how to come to independent conclusions. Students are encouraged to use the library, are given direction in methods of historical work and are taught the value of historical sources.

PHILOSOPHY, LOGIC AND ETHICS.

PHILOSOPHY.—The Juniors are required to prepare two recitations a week in Hill's Psychology during the first term. Jevons' and Ryland's Logics are studied during the second term. Special courses in Philosophy are given in Porter's Treatise on the Human Mind, Schwegler's History of Philosophy, Windelband's History of Philosophy, Fowler's and Ueberweg's Logics.

ETHICS.—In the third term both sections of the Senior Class pursue the study of Practical Ethics in Mackenzie's Ethics.

MILITARY DEPARTMENT.

This department is in charge of the Professor of Military Science and Tactics, an officer of the regular army, detailed by the War Department for the purpose.

The instruction is both practical and theoretical.

PRACTICAL.—The student, on entering College, is drilled in the School of the Soldier, including bayonet exercise, and is advanced successively, to the Schools of the Company and Battalion.

Considerable attention is given to target practice, the College being supplied with latest-model Springfield rifles and a liberal supply of rifle ammunition; also to Military Signaling.

THEORETICAL.—During the Junior and Senior years, elementary instruction, by means of lectures and recitations, is given in the Art and Science of War, Modern Tactics, Modern Small Arms and Cannon. Explosives, Military Correspondence and Reports, Care of Troops in the Field, Military and Martial Law, the Regular Army, the Volunteers, the Militia, and other military subjects.

Uniform.—A uniform, consisting of cap, blouse and trousers of dark-blue cloth, has been adopted, the cost of which is about $14, or considerably less than that of a good suit of civilian's clothes. The entire suit is neat and serviceable, and, while required to be worn at drills, may be worn on any occasion.

Military Drill is required of all students in the Scientific Department twice each week throughout the entire course, except as they may be excused by reason of conscientious scruples or physical disability.

In the Gymnasium, a drill-room and armory have been provided for purposes of military instruction.

The object of instruction in this department is not only to comply with the requirements of the laws of Congress for the State Colleges organized under the act of July 2d, 1862, but also to improve the health and physique of students, and to give that elementary military knowledge which every citizen should possess, that he may render intelligent and effective aid to his country or State in case of war or riots.

PHYSICAL TRAINING.

Exceptionally fine opportunities for Physical Training are afforded to all students by the Robert F. Ballantine Gymnasium, the Neilson Field and the Boathouse, which are elsewhere described.

At the beginning of his Freshman year each student is given a physical examination, conducted upon the same plan as that now in use at the leading colleges, and a complete record is made of his physical condition. This examination is repeated from time to time, and thus affords valuable information concerning the growth and development of the individual. At the time of the examination an anthropometric chart is drawn, showing the relation of the individual to the normal standard in size, strength and symmetry. From the information thus obtained cards are made out, specifying the exercises most suitable for each case.

With the students in the Scientific School Gymnasium attendance is optional. Classes are formed to suit the general convenience, and a progressive course of instruction is followed.

During the Winter term a class is formed from the two higher classes for instruction in fencing with foils and single-sticks.

Swimming is regularly taught during the Spring term.

GEOLOGICAL HALL RUTGERS

OPTIONAL STUDIES.

The members of the Senior Class in the Scientific School may attend the lectures upon the Fine Arts and upon the History and Art of Teaching which are delivered each year before the Senior Class in the Classical School.

THE FINE ARTS.

During the second term of this year there will be for the Seniors a course of lectures by Professor Van Dyke on the History of Painting, covering the ground from the earliest records of art in history to the present day. Van Dyke's "History of Painting" will be used as a text-book and all the lectures will be illustrated by lantern slides and the casts, photographs and facsimiles of the Fine Arts collection.

HISTORY AND ART OF TEACHING.

Instruction is given by means of lectures during one term of the Senior year to the students of the Classical School. Others who expect to teach, or who are interested in the subject, are allowed to attend the lectures.

The object of the course is to make the student acquainted with the most important educational theories and their place in history, and to introduce him to the study of the science and art of teaching. The principal educational classics are considered, and such practical work is done by reports and discussions as the time permits.

In addition to the maintenance of a satisfactory standing in the prescribed and elective studies, regular attendance upon the lectures and upon the examinations in optional subjects is required.

ELECTIVE COURSES.

COURSE IN AGRICULTURE.

The object of this course is to provide a broad scientific training, which is now recognized as essential to the best life on the farm.

The major studies of this course include Applied Agriculture, Biology, Botany and Entomology.

AGRICULTURE.—The study of the principles of scientific agriculture and their application to the different lines of farm practice is continued throughout both the Junior and Senior years. Ingle's "Manual of Agricultural Chemistry," supplemented by lecture notes, soil physics and soil bacteriology, are each studied in their relation to the production of plant-food and of plant substance. The origin and the formation of soils are discussed, and the attempt is made to represent by chemical equations the reactions occurring in the soil in the transformation of the inert organic and inorganic substances into available plant-food. In the second term of the Junior year the study of soils is taken up in greater detail, particularly that of soil physics as outlined in King's "The Soil."

The first term of the Senior year is devoted to the study of natural and artificial fertilizing materials. Aikman's "Manures and Manuring" and Voorhees' "Fertilizers" are employed, and are supplemented by discussions and illustrations. Inquiry is made as to the sources and composition of manures and fertilizers, as well as the manufacture and application of the latter. Special attention is given to the comparative study of commercial and agricultural values and the preparation of fertilizer mixtures for specific purposes. The second and third terms of the Senior year include the study of feeds and feeding. The sources, composition and digestibility of both concentrates and roughages for farm animals are studied, and careful attention is given to the study of digestion coefficients and the compounding of feeding rations,

as applied to given agricultural and economic conditions. The physiological processes of digestion and assimilation are carefully discussed in their relation to feeds and feeding, under varying conditions of agricultural practice.

A portion of the year is also devoted to the study of milk in its chemical and bacteriological relations; its production under modern hygienic conditions; its handling; its distribution; its manufacture into butter, cheese or other derivatives. The production of milk is studied likewise in connection with the general subject of dairy husbandry, including the methods of crop production on the dairy farm.

This is followed by the study of breeds and breeding and the intelligent selection of desirable types of animals. Proper consideration is accorded to the origin, characteristics and relative value of the prominent breeds of dairy cattle for one purpose or another.

Animal Biology.—In the Freshman year the students in Agriculture pursue Zoology two hours a week, the second term, reciting with other students of the Scientific School.

In the Junior and Senior years, Fall and Winter terms, students in Agriculture devote two morning hours and two afternoons a week to General Biology, as follows: General Biology of Plants, first half Fall term, Junior year; General Biology of Animals, second half of same term; Invertebrate Zoology, Winter term.

Vertebrate Zoology and Comparative Embryology, in the Fall term, Senior year; Comparative Anatomy of the Domesticated Animals and Economic Zoology in the Winter term.

For further details see the fuller description of these courses under the Course in Biology. While students in Agriculture devote less time to biological subjects than is required of regular students in Biology, with whom they meet, the portions of the work to which they give attention are chosen with especial reference to their needs. The study of the anatomy of domestic animals is furthered by demonstrations from a fine Auzoux model of the horse.

Botany.—In the second term of the Junior year the students examine with the compound microscope the minute structure of the leaves, stems, roots, flowers and seeds of various plants. The accompanying class-room exercises consist of recitations upon, and elaborations of, the work pursued in the laboratory.

During the third term the microscopic study of plants is continued, time being taken for making an herbarium of fifty species of flowering plants, named and neatly mounted.

In the second term of the Senior year a course of lectures is given upon vegetable physiology, and laboratory exercises are continued with ferns, mosses, lichens, algæ, etc. During the third term special attention is given to the various kinds of parasitic fungi, including rusts, mildews, moulds and blights, so destructive to crops.

Entomology.—In the third term of the Junior year a knowledge of the external and internal structure of insects and of their physiology is given, and especial attention paid to those features which have a bearing on the applied or economic side of the science. In the Senior year the classification is explained and the orders are taken up separately, the most injurious insects in each order serving as types. The collection contains examples of these in all their stages, and the laboratory work is largely directed to the practical handling of and dealing with the insects in all forms. Insecticides and insecticide machinery are taken up in the last term and the underlying principles of their successful use are taught. Smith's "Economic Entomology" is used as a text.

COURSE IN CIVIL ENGINEERING AND MECHANICS.

During the last three years the students in this course are instructed in Descriptive Geometry, Analytic Geometry, Railroad Curves, Differential and Integral Calculus, Analytic Mechanics, Hydromechanics, Civil Engineering, Bridge-Building and Geodesy, and have practice two afternoons a week in Draughting, with Exercises and Problems in Geometrical Constructions, in Descriptive Geometry, Topographical, Mechanical and Architectural Drawing and in Graphical Statics.

These subjects, with the exception of Geodesy, are taught by means of text-books supplemented with numerous practical examples in Descriptive Geometry, Analytic Geometry, Railroad Curves, Differential and Integral Calculus, Statics, Kinematics and Kinetics, Hydromechanics, Roofs and Bridges.

The course in Hydromechanics embraces a study of the principles of Hydrostatics and Hydraulics, including the laws of the flow of water through orifices, pipes, tubes, weirs and open channels, with numerous problems illustrating many of the practical applications of these principles.

The course in Roofs and Bridges embraces a study of the theory and computation of the stresses in roof and bridge trusses under dead, live and wind loads, and under locomotive-wheel loads on bridge trusses, with numerous problems for illustrating the principles.

Geodesy is taught by means of lectures, including many practical examples from the United States Coast and Geodetic Survey, which the student is required to work out. He is taught how to measure base-lines and reduce them to the sea-level, how to measure angles and adjust them by the method of least squares, and how to compute latitudes, longitudes and azimuths from the field notes. The object of this course is to ground the student well in mathematics and to give him a substantial knowledge of the theory of civil engineering.

A summer school for field practice in surveying and railroad engineering has been conducted during several weeks of the summer vacations of each year since 1899 for the benefit of those members of the Junior and Freshman classes who chose to avail themselves of the opportunity.

COURSE IN CHEMISTRY.

During the last three years, students in this course are instructed in General, Experimental and Agricultural Chemistry, Crystallography, Blowpipe Analysis, Descriptive and Determinative Mineralogy, Analytical, Organic, Applied and Theoretical Chemistry.

Experimental Chemistry is taught by carefully conducted quizzes in the recitation-room and full work in the laboratory. The student's first and general knowledge of chemistry is obtained by his own observation.

Blowpipe Analysis comprises the study of the various reactions and the analysis of a number of substances. Laboratory work is accompanied with constant quizzing in the recitation-room.

General Chemistry is taught from a text-book fully illustrated by experimental lectures, during two terms of the Sophomore year.

Organic Chemistry begins in the third term of Sophomore year.

In the first and second terms of Junior year the subject is continued by those in the Chemical Course only. The student is constantly questioned and expected to show a thorough knowledge of all principles developed in the text-book. He also is given imaginary problems and taught how to plan an investigation with carbon compounds, thereby gaining a theoretical knowledge of the methods of research in this subject. Laboratory work follows in the Senior year.

The lectures are accompanied by full experimental illustrations.

Analytical Chemistry.—The student commences with experiments on bodies of known composition, performing those experiments that characterize common, simple substances, until he is perfectly familiar with the reactions, both theoretically and experimentally, the theoretical part being considered in the class-room. Then complicated bodies are examined, until most difficult substances are readily analyzed.

Quantitative Analysis is taught in a similar way. The student first analyzes substances of known composition until perfectly familiar with the peculiar manipulation in this subject.

Then he proceeds to substances of unknown composition. Through one College year instruction is given, with recitations and questionings during the first term.

Stoichiometry is taught by lecture, recitation and blackboard drill.

Applied Chemistry.—The application of Chemistry to the arts and manufactures is taught by lectures and text-book. Whenever it is practicable the actual products are exhibited to the students and the manufacturing processes reproduced in miniature. Attention is drawn to the scientific relations and connections between the various manufactures. The great losses by imperfect methods of manufacture and by waste products are pointed out, and the student is taught to see the true economy of production. Illustrative of the lectures, visits are made to various manufacturing establishments, of which there are a number in and about New Brunswick, and an opportunity is given to see manufacturing operations in actual working.

The Principles and Theories of Chemistry having recently developed in a very remarkable way, form a most important branch of Chemistry. Accordingly, the subject extends throughout the Senior year, including class-room work and laboratory practice, the necessary mathematics having been studied in the Sophomore year.

Thesis.—After finishing experimental organic chemistry the student takes up work for his thesis chosen by him, but subject to the approval of the instructor.

Mineralogy is taught in the Junior year. In the second term there is a course of lectures in Descriptive Mineralogy, in explanation of a text-book, in which the general characters of minerals are discussed, and some of the most important species are carefully studied. Special attention is paid to Crystallography, as being one of the most distinguishing characteristics, and therefore much used in Determinative Mineralogy, which occupies the third term. In this part of the course the student

learns to make the tests by which minerals are distinguished from each other, and becomes familiar with their differences by actual handling and comparison. In this course use is made of the College collections, supplemented by the private collection of the Professor in charge. These collections are becoming more and more complete year by year, and are now fully adequate for the illustration of the subject.

Geology is studied in the first and second terms of the Senior year. A text-book is used, but each lesson is explained in advance and fully illustrated by the use of specimens, with which the College is abundantly supplied.

COURSE IN ELECTRICITY.

This course is similar to that in Civil Engineering, Electrical subjects being substituted for Railroad Curves, Bridge-Building, Geodesy and Hydromechanics.

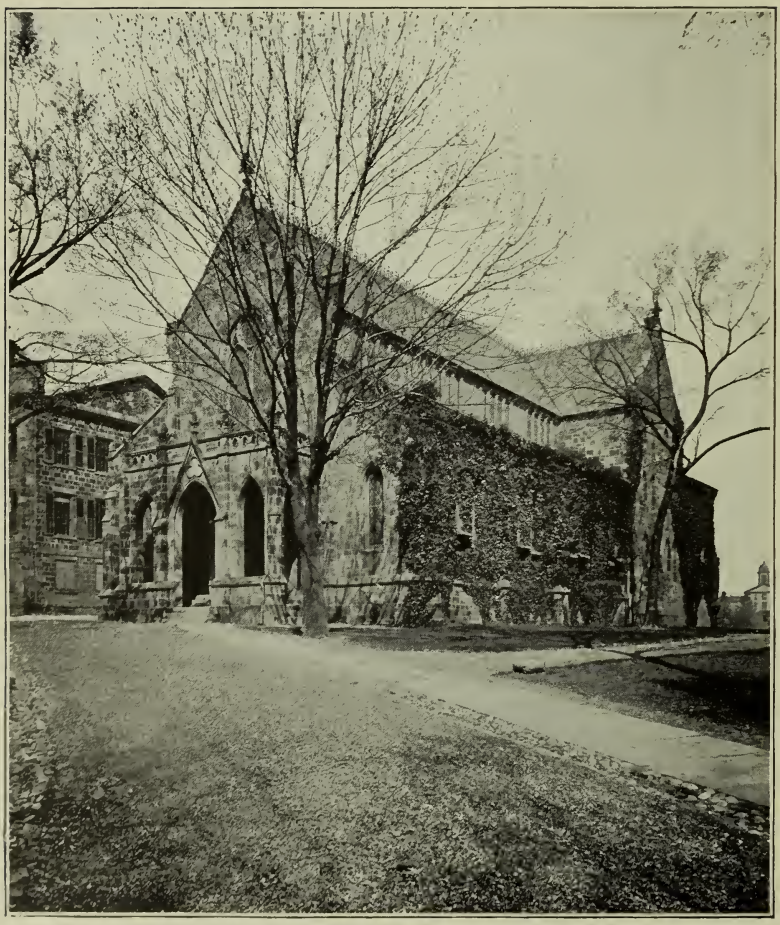
Its object is to prepare for post-graduate courses in technical institutions, and for electrical pursuits which do not demand, at the outset, a complete professional training.

The laboratory is provided with engines, dynamos, motors and other apparatus needed for measurement and testing.

Work in the laboratory is required throughout the Junior and Senior years, and consists of a course of experiments designed to familiarize the students with measuring apparatus while training them in careful quantitative operations. The Senior year is occupied in management and testing of electrical machinery, and it is customary to visit electric light and power plants to study industrial practice on its actual scale.

COURSE IN BIOLOGY.

Students electing this course divide the time between three departments (Zoology, Botany, Entomology) during the Junior and Senior years, according to the following



KIRKPATRICK CHAPEL RUTGERS

SCHEDULE FOR ELECTIVE BIOLOGY.*

	JUNIOR YEAR.		SENIOR YEAR.	
First term	General Biology of Lower Cryptogams.	General Biology of Lower Invertebrates.	Systematic Entomology.	Osteology. Histology of Lower Vertebrates.
Second term...	Vegetable Histology.	Zoology of Higher Invertebrates.	Vegetable Physiology.	Embryology and Mammalian Anatomy.
Third term....	Vegetable Histology.	Anatomy and Physiology of Insects.	Vegetable Pathology.	Systematic and Economic Entomology.

* For the number of hours, see schedule on page 34.

Zoology is required in the Freshman year, second term, two hours a week, of all students. For the present year Dodge's "General Zoology" is used as a text-book, supplemented by lectures and demonstrations.

The elective work is mainly in the laboratory and is pursued by means of microscope and scalpel. The student sketches and describes the objects studied. Supplementary lectures are given. Each student provides himself with Parker's "Lessons in Elementary Biology" for the quiz work, and for the laboratory with a small case of instruments. Other apparatus, microscopes and materials are provided in the laboratory, for which a fee is required. The Seniors use, as additional texts, Kingsley's "Comparative Zoology," and Le Conte's "Comparative Physiology and Morphology."

Botany.—Laboratory study in Botany begins in the second term of the Junior year, and students then pursue a course in vegetable anatomy with the compound microscope, in which they are introduced to the various kinds of tissues and tissue systems as illustrated in the leaves, stems and roots of the higher plants.

In the third term laboratory practice is continued with the histology of the organs of reproduction, and the collecting of plants in the field is begun. Each student prepares an herbarium of at least fifty species, all neatly mounted and fully labeled.

The Seniors, in their second term, have a course of lectures upon Vegetable Physiology, special attention being paid to the origin of varieties through cross-fertilization and other causes. In the laboratory each member of the class becomes familiar, microscopically, with the histology of cryptogams, particularly those best enforcing the principles in Physiology considered in the class-room. The third term is especially devoted to a consideration of those low organisms that are so obscurely known under the general term of the fungous diseases of plants, embracing one branch of Economic Botany, now called Vegetable Pathology.

Entomology.—In the third term of the Junior year, Entomology is taught, and a knowledge of the external and internal structure of insects and of their physiology is given, especial attention being paid to the morphological and biological side of the science. In the Senior year an outline of the system of classification is gained by a study of leading types of all the orders, and the students are required during laboratory hours to prepare, classify and arrange collections, in part made by themselves. A very full collection of the insects of the United States will assist in acquainting the student with the family types. The aim is to give such a knowledge of the subject, as a whole, as will enable the student to specialize without further assistance should he desire to continue the study at the conclusion of the course. Smith's "Economic Entomology" is used as a text.

COURSE IN CERAMICS.

A necessary preparation for this course is a thorough training in the principles of Chemistry, with sufficient laboratory practice to enable the student to determine accurately the chemical and the rational analysis of clays. This portion of the work is done

during the Sophomore and the Junior years in the chemical laboratory. Knowledge of the principles is also imparted by lectures and quizzes.

As the ceramist is engaged in working with raw materials mined from the earth, it is proper and necessary that he should have a knowledge of the history and structure of the earth's crust. The student is therefore taught the sciences of Crystallography, Determinative Mineralogy, General and Economic Geology.

The world over, there are men of science seeking for the true interpretation of problems that confront them in the laboratory or the manufactory. To keep in touch with these workers we must have recourse to the published results of their investigation. No man therefore is properly equipped until he can use the scientific journals as a tool. A practical knowledge of French and German at least is necessary, and provision is made in the course for reports by the student based on papers published in current numbers of scientific journals.

Lectures and recitations on clay materials, clay products, bodies, glazes and enamels are held during the Junior and the Senior years. This is supplemental by practical work in the laboratory, where the excellent facilities of the department equipment permit of practical demonstration in the manufacture of a wide range of ceramic wares.

Instruction is also given in the use of various fuels, construction of kilns and machinery.

Further, the location of this department should be noted as exceedingly fortunate. On one hand are the famous Trenton potteries, while even nearer are the very extensive brick-making plants located along the Raritan river. Students following the course of study may visit these industries to their profit.

Short Course in Ceramics.—This course has been instituted especially for those earnest, ambitious young men who have had practical experience in clay-working, but for various reasons find themselves unable to undertake the full course. The requirements for admission are of the simplest consistent with the purpose of the course. They are, a good character, a common school education and evidence of ability to maintain their place

in the class. The requirements of the course are not severe, and it is believed that the faithful student may, by a minimum of effort, better equip himself for his life work. There is no intention of encouraging the attendance of the incompetent. This course does not lead to a degree, but a certificate is given on the completion of the course stating the amount of work accomplished.

SECOND ANNUAL REPORT

OF THE

Department of Clay-Working and Ceramics,

OF THE

RUTGERS SCIENTIFIC SCHOOL,

THE NEW JERSEY STATE COLLEGE FOR THE BENEFIT OF AGRICULTURE AND THE MECHANIC ARTS,

NEW BRUNSWICK, N. J.,

For the Fiscal Year Ending October 31st, 1903.

FINANCIAL STATEMENT.

THE TRUSTEES OF RUTGERS COLLEGE

FOR

THE NEW JERSEY STATE AGRICULTURAL COLLEGE,

IN ACCOUNT WITH

THE DEPARTMENT OF CLAY-WORKING AND CERAMICS APPROPRIATION, 1903.

Dr.

To receipts from the Treasurer of the State of New Jersey, as per appropriation, for the fiscal year ending October 31st, 1903, as per Laws of New Jersey, 1902, chapter 256, section 85		$2,500 00
By Salaries	$1,580 00	
Labor	39 53	
Publications	55 00	
Postage and stationery	44 97	
Freight and express	42 14	
Fuel, light and water	159 76	
Chemical supplies	6 85	
Supplies of materials	17 10	
Sundry supplies	56 41	
Technical collection	4 50	
Library	65 27	
Tools, implements and machinery	105 81	
Furniture and fixtures	90	
Scientific apparatus	51 31	
Traveling expenses	71 17	
Contingent expenses	62 76	
Building and repairs	136 52	
Total		$2,500 00

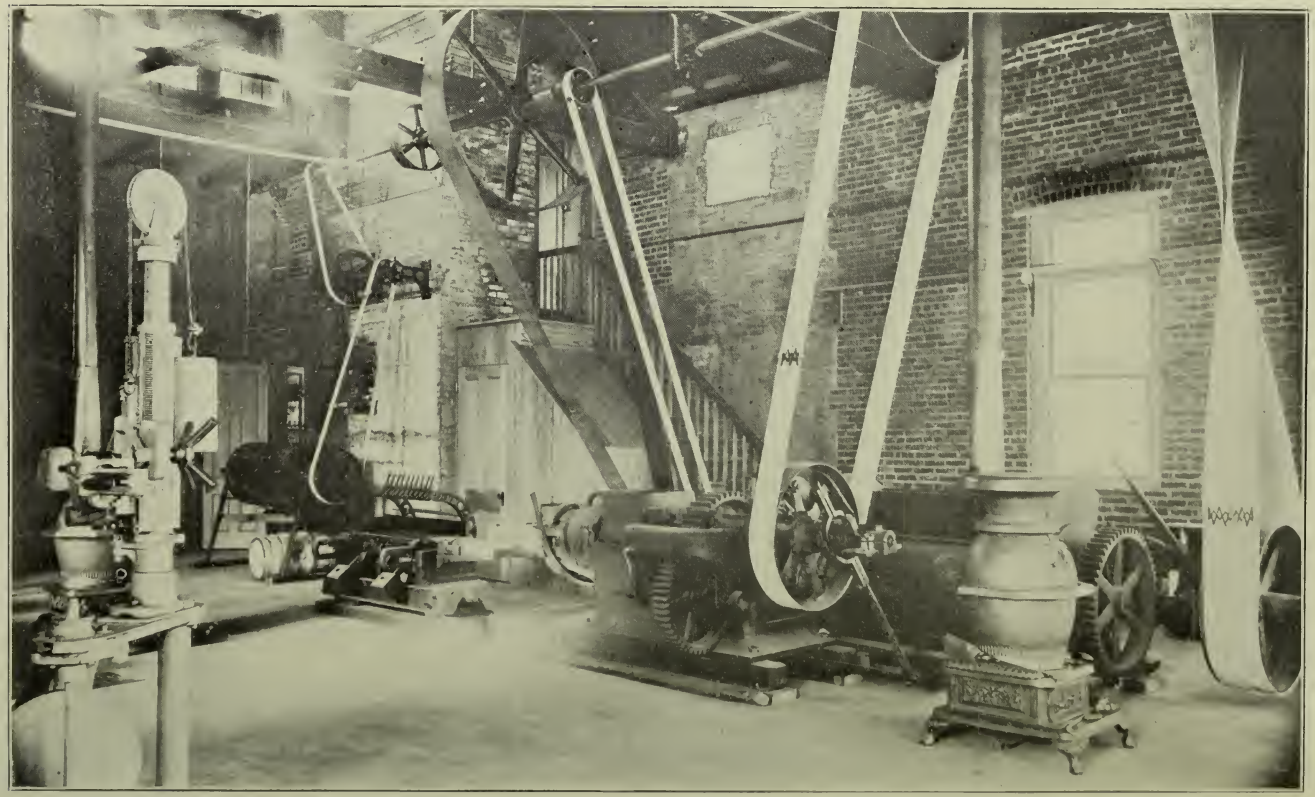
We, the undersigned duly appointed auditors of the corporation, do hereby certify that we have examined the books and accounts of the Department of Clay-Working and Ceramics for the fiscal year of the State ending October 31st, 1903; that we

have found the same well kept and classified as above, and that the receipts for the year from the Treasurer of the State of New Jersey are shown to have been $2,500, and the corresponding disbursements $2,500, for all of which proper vouchers are on file, and have been by us examined and found correct, thus leaving no unexpended balance.

And we further certify that the expenditures have been solely for the purpose set forth in the Laws of New Jersey, 1902, chapter 256, section 85.

AUSTIN SCOTT,
WILLIAM H. LEUPP,
Auditors.

BUILDING OF THE DEPARTMENT OF CERAMICS



A VIEW OF THE BRICKMAKING OUTFIT

REPORT OF THE DIRECTOR,

CULLEN W. PARMELEE.

REPORT OF THE DIRECTOR.

The past year has been very encouraging for those interested in the department. The first term was devoted to the details incidental to the completion of the organization and installation of the apparatus. In the latter, the students lent very efficient aid and profited by the experience gained in working on a practical problem. During the remaining two terms, lectures and recitations on ceramic topics were had, and experimental work in the laboratory was successfully carried on.

Seven students elected the course in clay-working and ceramics, two of whom, having been permitted, by special action of the Faculty, to substitute in their Senior year, work in ceramics for work, respectively in chemistry and electricity, graduated at the end of the year, receiving the degree of B.Sc. Their theses were as follows:

"An Examination of the Physical and the Chemical Properties of a New Jersey Clay." Mr. Daniel H. Applegate, Jr., of Red Bank, New Jersey.

"The Chemical and the Physical Properties and Probable Commercial Uses of a Florida Clay." Mr. David Raymond Edgar, of Metuchen, New Jersey.

In accordance with the purpose of the department to pursue the study along practical lines, a number of excursions were made to adjacent clay-working industries, in order that the students might have the benefit of witnessing clay-working operations conducted on a manufacturing scale. The clay deposits along the Raritan were also visited, and studied with reference to their geological formation and the methods of mining employed.

Many cordial expressions of interest have been received from those engaged in the clay-working industries, and we have been the recipients of numerous inquiries for information regarding

the department, not only from citizens of New Jersey, but from those of many other States.

One of our interested friends, Mr. Walter T. Griffin, '75, has kindly offered a ceramic collection of clays and wares typical of Thuringra, Bohemia, Meissen, Carlstadt, Rudolstadt, Selbe, Limoges, etc., and Great Britain. A portion of the gift has arrived, and the remainder is being gathered.

The department has made firing tests of samples of clays for those seeking information, and investigations are being carried on, the results of which will be published at the proper time.

EXTENSION DEPARTMENT.

The work of the Extension Department has become familiar in most of the larger towns of the State, and also in many agricultural communities. It is conducted in accordance with the methods of "University Extension." A course of lecture-studies consists of the following elements:

(*a*) A series of lectures.
(*b*) A printed syllabus.
(*c*) A class-hour, or hour of conference following each lecture.
(*d*) Written exercises by members of the class.
(*e*) An examination open to those who have taken the whole course.
(*f*) Appropriate credits issued to successful students.

Every part of this work is voluntary. Many simply attend the lectures and do not enroll themselves as students, but all are encouraged to take the full course, since a far better knowledge of the subject can be thus obtained. Courses consist of six or twelve lecture studies.

For the season of 1903-1904 the following courses are offered, to which additions will be made as required:

Agriculture.

1. Soils and Crops,

By Professor Edward B. Voorhees, D.Sc.

This series of lectures will include, under soils, a discussion of the origin, formation and distribution of soils, their chemical composition, physical properties, relations to temperature and soil-water, exhaustion, methods of improvement, tillage and drainage; and under crops, a discussion of the origin, habits of growth, composition, characteristics, methods of rotation, cultivation, management and uses of the leading farm, orchard and garden crops.

2. The Food of Plants,

By Professor Edward B. Voorhees, D.Sc.

In these lectures will be discussed the constitutents of plants, their sources and functions; farmyard and green manures, waste products and their composition, properties and uses of concentrated or artificial manures, the sources, composition and uses of phosphatic, nitrogenous and potassic compounds; methods of manufacture of prepared fertilizers; considerable attention will also be given to economical methods of buying manures, the preparation of formulas, and the methods of application and use for the various crops.

3. Animal Nutrition,

By Professor Edward B. Voorhees, D.Sc.

In these lectures the principles of nutrition will be discussed with particular reference to the formation of the various animal products. This will include a study of the composition of the animal body and its relation to food, the composition of fodders and feeds, their digestibility and proper use for the various animals, the relative value of natural and artificial grasses, the formation and improvement of permanent pastures, the buying of feeds and the preparation of rations, and the manurial value of feeds. The principles of breeding and the importance of pure breeds of domestic animals, and their relations to improved farming; breeds for the dairy, dairy management, the composition of milk and of the various dairy products, will also receive attention.

4. Agricultural Botany, (1)

By Professor Byron D. Halsted, S.D.

A course of lectures upon the structure and uses of the various organs of vegetation, together with a consideration of some of the more serious enemies to cultivated plants and methods of overcoming them; weeds, their habits, seeding capacity and methods of treatment; dodders and other parasites, rusts, mildews, smuts, blights, etc.; spraying trees and herbs with fungicides. These lectures are illustrated with the lantern and by means of numerous wall-charts, maps and the specimens themselves.

5. Agricultural Botany, (2)

By Professor Byron D. Halsted, S.D.

This course is designed to aid the crop-growers in combating the fungous enemies in their fields, orchards, vineyards and gardens. It treats of the various rusts, smuts, mildews, blights, rots and decays caused by fungi, with their remedies; the composition, methods of mixing and application of fungicides; the treatment of soil with fungicides for the scabs of potatoes, the rots of sweet potatoes, club root of turnips and cabbages, etc.

6. Economic Entomology, (1)

By Professor John B. Smith, D.Sc.

So much of the anatomy and physiology will be given as is required to make intelligible the methods of insect increase and injury, and the philosophy of application of insecticides. The transformations and characters of the injurious species will be explained and remedial or preventive measures suggested. The subject of insecticides, their character and methods of application; cultivation; the use of fertilizers in certain cases and general farm practice to avoid insect injury, will be fully discussed. All the lectures will be illustrated by lantern slides.

7. Economic Entomology, (2)

By Professor John B. Smith, D.Sc.

This series is in continuation of the first, and the special subjects are: Parasites, their use and benefits; insects as pollinators of fruit blossoms; social insects and their bearing on agriculture; distribution of injurious species and means of preventing it; insect diseases, and nature's check to increase; latest development in methods dealing with insects.

8. Application of the Principles of Physics,

By Professor F. C. Van Dyck, Ph.D.

Introductory lecture on matter, force, work, energy, power; the mechanical powers, levers, pulleys, wheel and axle, inclined plane and screw; principles of water-supply, water-power, windmills, etc.; heating and ventilation; the steam engine and its applications; principles of electricity as applied to lightning protection, alarms and small power.

9. Construction of Roads, Bridges and Drains,

By Professor A. A. Titsworth, M.Sc., C.E.

Telford, Macadam and other roads in relation to local conditions, and cost of construction, illustrated by diagrams; economics of good roads; bridges on country roads, best and cheapest structures, sizes of timber; graphic methods of determining strains; drainage, best European practice with applications to conditions of climate and soil here, simple methods of leveling for drains.

General courses are offered as follows:

History and Social Science.

COLONIAL DAYS IN AMERICA, (6)

By Everett T. Tomlinson, Ph.D.

The different classes of colonists, from what lands they came, and their motives in coming to America; the customs brought with them and the new ones adopted; their life, dress, habits, religion, forms of worship, training of children, wars, government, education, observances, traditions, superstitions, etc.; the quality and conception of life as contrasted with that of the present; their writers and speakers; elements which have survived in modern times.

THE AMERICAN REVOLUTION, (6)

By Everett T. Tomlinson, Ph.D.

Causes which led to the separation of the American colonies from Great Britain; the struggle in the Eastern Colonies; the contest as it was waged in the Middle Colonies; the war in the South; the struggle on the sea; the results, and the heroes and heroines of the American Revolution. The outlines of the famous struggle, and the experiences of the common people, as well as of the armies and leaders, are given.

THE SPANISH-AMERICAN WAR, (6)

By Reverend George Hubbard Payson, A.M.

The United States and Spain; Cuba and the Cuban War; Our War with Spain, its causes and beginning; its conclusion and effects; famous persons of the war; important places of the war; our new possessions, the Philippines, Porto Rico. Illustrated by the stereopticon.

SOCIOLOGY,

By Reverend George Hubbard Payson, A.M.

The aim of this course in the science of the society is to study the principles upon which modern social reforms may be securely based, and present-day civic problems successfully solved. The following topics will be discussed: The problem of the country town; the city center; immigration; industrial life; capital and labor; Sunday rest and the working day; poverty and charity organization; crime and prison reform; the liquor power and the temperance problem; the family, marriage and divorce; government, citizenship, civics and municipal reform; the school and the new education; the church, Christian co-operation, the signs of the times, the Gospel for to-day.

Literature.

The Literary Study of the English Bible,

By Reverend Ferdinand S. Schenck, D.D.

This course consists of two parts of six lectures each. Part I.—The Old Testament; The Hebrew in its Anglo-Saxon Garb; The Earliest Literatures, Genesis; The Epic Story, Poetry and Oratory of the Pentateuch; Constitutional History and Heroic Narrative; The Temple Song Books and the Great Drama; The Wisdom Literature, The Oratory and Poetry of the Prophets. Part II.—The New Testament; The Order in which the Books were written; The fourfold Matchless Story; The Oratory and Poetry of the Lord Jesus Christ; The Eloquence of Speech and Life of the Early Christians; The Great Letters; The New Testament Outlook.

Some Representative Names in English Literature,

By Professor A. V. Williams Jackson, Ph.D., L.H.D.

An introductory course in which characteristic names and works are selected to represent the various epochs in English literature from the Anglo-Saxon period to modern times. The design of the lectures is to teach methods, to stimulate thought, and to arouse interest for pursuing the subject further.

Shakespeare and the English Drama,

By Professor A. V. Williams Jackson, Ph.D., L.H.D.

The historical development of English dramatic literature until after the days of Shakespeare. The course deals with the drama in general, its rise in England, Shakespeare, his predecessors and successors, and gives a sketch of the Elizabethan stage and companies of players.

India and Persia,

By Professor A. V. Williams Jackson, Ph.D., L.H.D.

A study of the literature and civilization of Ancient India and Persia, treating of the following topics: The Vedas, the Ancient Hymns of India; The Development of the Life and Thought of the Ancient Brahmans; Great Sanskrit Epics; Hindu Drama, with Parallels from Shakespeare; Kalidasa's Successors in the Drama of India; Sanskrit Lyrics, Romances and Fables; Buddhism and its Literature; Ancient Persian Inscriptions: Sermons in Stones; Sacred Books of Ancient Persia; Zoroaster, the Prophet of Ancient Iran; The Parsis of To-day and Their Ancient Faith; Later Persian Literature.

The Poets of Our Century,

By Professor Louis Bevier, Jr., Ph.D.

This course consists of two parts, each containing six lectures. Part I.—The Victorian Poets, treating particularly Tennyson, Browning, Mrs.

LABORATORY OF THE NEW JERSEY STATE AGRICULTURAL EXPERIMENT STATION

Browning, Rosetti, Morris and Swinburne. Part II.—The American Poets, particularly Bryant, Whittier, Longfellow, Holmes, Lowell and Lanier. The course deals with each poet from the evolutionary standpoint, treating as far as possible his relation to the particular environment of his time and place and the general environment of his culture. It is illustrated by readings from the best and most characteristic works of each poet.

Modern French Lyric Poetry, (6)

By Edwin B. Davis, B.L.

The object of this course is to trace the development of modern French lyric poetry and to establish its relations with the important phases in the evolution of thought and character in France. The principal literary schools and epochs of the nineteenth century will receive special treatment, including romanticism, realism—and so-called naturalism—and symbolism. Illustrative quotations will be presented from Lamartine, Victor Hugo, de Musset, de Vigny, Gautier and others.

The Greek Poets,

By Professor Louis Bevier, Jr., Ph.D.

The course consists of two parts, each of six lectures. Part I.—The Epic and Lyric, discusses the rise and development of the Greek literature, and treats particularly of Homer, the great Epic Poet, and of Pindar, the greatest Lyric Poet of Greece. Part II.—The Attic Drama. The purpose of this will be to trace the formation of the drama as a literary type, to define its position in Greek literature, and to make the audience acquainted with a few of the greatest extant Greek dramas. The Greek stage, costumes, actors, etc., will be described, and at least one play of Aeschylus, Sophocles, Euripides and Aristophanes will be fully outlined. Illustrated by stereopticon.

Philosophy and Pedagogy.

The World's Great Thinkers,

* By Professor Jacob Cooper, D.D., D.C.L.

A course of lectures on mental philosophy, treating the subject historically. Introduction. Wonder originated philosophy, seeking reality under phenomena. Socrates—the talker; Plato—the ideal philosopher; Aristotle—the logical systematizer; Lucretius—the skeptic; Cicero—the dealer in second hand; Abelard—the lover; Aquinas—the hair-splitter; Descartes—the renovator; Spinoza—the pantheist; Leibnitz—the universal genius; Pascal—the thinker; Kant—the transcendentalist; Hegel—the obscure; Schopenhauer—the pessimist; Bacon—the philosophic statesman; Locke—the sensationalist; Hume—the agnostic; Berkeley—the idealist; Reid—the philosopher of common sense; Schleiermacher—the philosopher of religion; Hamilton—the critic; Porter—the expositor.

* Died while the Catalogue was in press.

Educational Epochs,

By Professor Eliot R. Payson, Ph.D.

This course aims to give a general view of the curriculum, of educational theories and practices, and of the labors of great educators at different periods. Striking innovations and curious customs will be noticed. Among the topics studied will be education among the Greeks and Romans and the Jews; the university era; the bearing of the Renaissance and of the Reformation upon education; the educational reformers of the seventeenth century; the schools of the Jesuits; Pestalozzi and universal education; Frœbel and self-activity; Herbart; the progress of education in the United States; some present problems.

Science.

Astronomy,

By Professor Robert W. Prentiss, M.Sc.

The first lecture deals with the solar system; treating of the sun and its phenomena; spectrum analysis and the constitution of the sun; the moon, its appearance, motions, scenery and physical condition; the planets, comets and meteors, their mutual relations. The system of the stars is discussed in four lectures, treating of the fixed stars; multiple stars, star clusters and nebulæ; the nebular origin of stars; the extent of the universe. The two concluding lectures give an account of the instruments and methods of modern astronomy; the great telescopes of the world; astronomical photography. These lectures are illustrated by lantern slides and astronomical photographs obtained from the principal obesrvatories of the world.

Botany,

By Professor Byron D. Halsted, S.D.

This course consists of six lectures upon the following subjects: 1. The seed, its origin, structure and uses. 2. Stems and roots, giving the various kinds and functions of each. 3. Leaves—forms, structures and specifications for various purposes. 4. Flowers, their parts and functions. 5. Fruits, their kinds, etc. 6. Flowerless plants, as ferns, mosses, algæ and fungi, including mildews, moulds and many other miscroscopic forms. The second half of the course includes practical plant dissection, the object being to impart a working knowledge of the analytical key and the methods of making a collection (herbarium) of dried plants.

Electricity,

By Professor F. C. Van Dyck, Ph.D.

The fundamental facts of static electricity and the fluid theory; technical terms and units; frictional and induction machines, condensers; natural phenomena; principles and practical applications of magnetism; voltaic

couples; measuring instruments, arrangements of circuits, Ohm's law; decomposition by the current laws of electrolysis, counter electromotive force, storage cells; heating of conductors by current; production of current by heat.

Entomology,

By Professor John B. Smith, D.Sc.

This course, to be illustrated with lantern slides, will give an outline of the peculiarities of insect structure and physiology; will deal with the species useful to man and those annoying to or parasitic upon him; will describe the social organizations found among them, their occupations, trades and building habits, and their relations to the pollination of flowers.

Physiology,

By Professor Julius Nelson, Ph.D.

Part I.—Structure of human body and of lower animals compared, as to framework, general anatomy and minute structure; an outline of the animal kingdom is included. Part II.—Foods, fermentation, alimentation, circulation, respiration, nutrition, excretion. Part III.—Organs of offense, defense and protection, sense organs, nervous system, locomotion. Part IV.—Genesis of living beings, life histories, principles of heredity.

Zoology,

By Professor Julius Nelson, Ph.D.

This course begins with a study of the oyster, after which the sub-kingdoms are taken up in order, beginning with the lowest form of life and eding with the highest, as follows: Life, protoplasm and cells; animalcules and sponges, jellyfish and corals; worms; lobsters, etc.; clams, snails, etc.; starfishes and sea urchins; sea squirts, fishes and frogs; reptiles and birds; mammals.

The cost of courses other than the Agricultural Courses to any organization in the State constituting itself an Extension Center averages about $20 a lecture-study, but those requiring illustration with the lantern or by means of experiments are somewhat more expensive. Details will be given on application. This charge entitles a center to the entire course and to seventy-five copies of the syllabus. If more than seventy-five copies of the syllabus are required they may be had at ten cents a copy. These are the charges for the work under all heads except that of Agriculture. For the courses in Agriculture the price has been set at $10 a lecture-study.

All inquiries should be sent to Lewis Bevier, Jr., the Secretary of the Extension Department.

THE NEW JERSEY STATE AGRICULTURAL COLLEGE EXPERIMENT STATION.

By the Act of Congress of March 2d, 1887, a law was passed entitled "An act to establish Agricultural Experiment Stations in connection with the Colleges established in the several States under the provisions of an act approved July 2d, 1862, and of the acts supplementary thereto." This act is commonly known as the "Hatch Act," from the active interest taken in its passage by Hon. William H. Hatch, M.C., of Missouri. It authorizes the appropriation of $15,000 annually for the support of Agricultural Experiment Stations in connection with the Colleges which were established in the several states, "for the benefit of Agriculture and the Mechanic Arts," by the Congressional Act of July 2d, 1862.

The Legislature of New Jersey, by its acts of March 16th, 1887, and of March 5th, 1888, designated the Trustees of Rutgers College "as the parties to whom all moneys appropriated by Congress under said acts of Congress or supplements thereto shall be paid for the purposes mentioned in said acts of Congress." The department of Rutgers College known as Rutgers Scientific School is, by law, the State Agricultural College. The Agricultural Experiment Station is established in connection with it.

By the co-operation of the State Experiment Station, a large and well-fitted laboratory has been erected, and investigations are in progress upon the insect enemies of plants, upon the food-products of our fresh and salt waters, and their improvement, upon the diseases of plants and the application of science to the growth of agricultural and horticultural products, and upon the food consumption and the value of the products of the best breeds of dairy cattle.

While the main business of such a Station is in searching after new truths, and arranging them for practical and economic use, the proper location for it is in connection with an institution of learning. Almost all our investigators are teachers. The investigation and diffusion of knowledge necessarily go hand in hand; and the example of men devoted to the searching for useful

truths is stimulating to those who are yet in their preparatory studies, and are aspiring to fill well their places in life.

It is from those now preparing that our future investigators must come, and it is important that they should have those who are now in the field of work directly before them. In this respect it is believed the location of the Station at the College is most salutary in its influence.

The foregoing report is respectfully submitted,

AUSTIN SCOTT,
President.

GENERAL INFORMATION.

EXAMINATIONS.

The classes in both Schools are examined at the close of each term. These examinations are partly oral and partly written, and have an important bearing upon the standing of the student in his class.

Unexpected examinations at irregular intervals are held at the discretion of each instructor. The object of these examinations is to cultivate the habit of considering the relations of each day's work to what has been done before, and to stimulate effort on the part of each student to gain a comprehensive knowledge of the subjects studied.

At the end of the first and third terms, the examinations of the classes of the Scientific School are held in the presence of the Board of Visitors, who then make their semi-annual visits to the institution.

At the end of the third term each member of the Graduating Class is required to write a thesis on some subject approved by the Professor or Professors in charge of his elective course or courses.

This thesis must be acceptable to the Professor under whose direction it has been prepared, and the author is required to submit a copy suitable in all respects for binding and for permanent preservation in the College Library.

The final examination of the Graduating Classes is held four weeks before Commencement, from which time they are subject to such duties as are required for their preparation for Commencement.

Students who receive conditions at the June Examinations must report at College prepared to be examined upon the whole of each of the subjects on which they have conditions, at 10 A. M. on the Tuesday before College opens, in September.

GRADUATION.

To all members of the Graduating Class of the Classical School, in full standing, the Trustees grant diplomas conferring the Academic degree of Bachelor of Arts.

To all members of the Graduating Class of the Scientific School, in full standing, the Trustees grant diplomas conferring the Academic degree of Bachelor of Science.

To students, in either School, who have satisfactorily pursued special courses of study, a certificate is granted stating the studies pursued and the attainments made.

CLASS HONORS.

The following regulations have been adopted by the Board of Trustees regarding the graduating exercises at Commencement:

1. Three scholarship honors shall be awarded in each school to those members of the graduating class who shall stand first, second and third, respectively, in general scholarship, provided that in each individual case the student so standing shall have maintained a high rank in the special and elective studies of his course.

A failure on the part of any candidate to fulfill this condition will render the student standing next in grade of general scholarship eligible, subject to the same condition.

2. There shall be no distinction by way of comparison between the scholarship honors of the Classical School and those of the Scientific School.

3. The three scholarship honors of each School shall be designated as follows:

CLASSICAL SCHOOL.	SCIENTIFIC SCHOOL.
First Honor—Philosophical Oration.	First Honor—Scientific Oration.
Second Honor.	Second Honor.
Third Honor.	Third Honor.

4. Three other orations shall be awarded to members of the graduating class in either class in the order of their grades in composition and elocution during the Junior and Senior years, but only those students are eligible who shall stand in general scholarship in the first half of their class.

The first of these orations shall be known as the rhetorical honor and may be awarded to a student who has also received one of the scholarship honors, in which case, however, he shall deliver but one oration at Commencement; the other two shall be awarded to students who have not received any of the scholarship honors.

SPECIAL HONORS.

Department or Individual Honors may be granted in each elective subject. Such an honor will be granted to that student who stands highest in the particular elective subject, on two conditions:

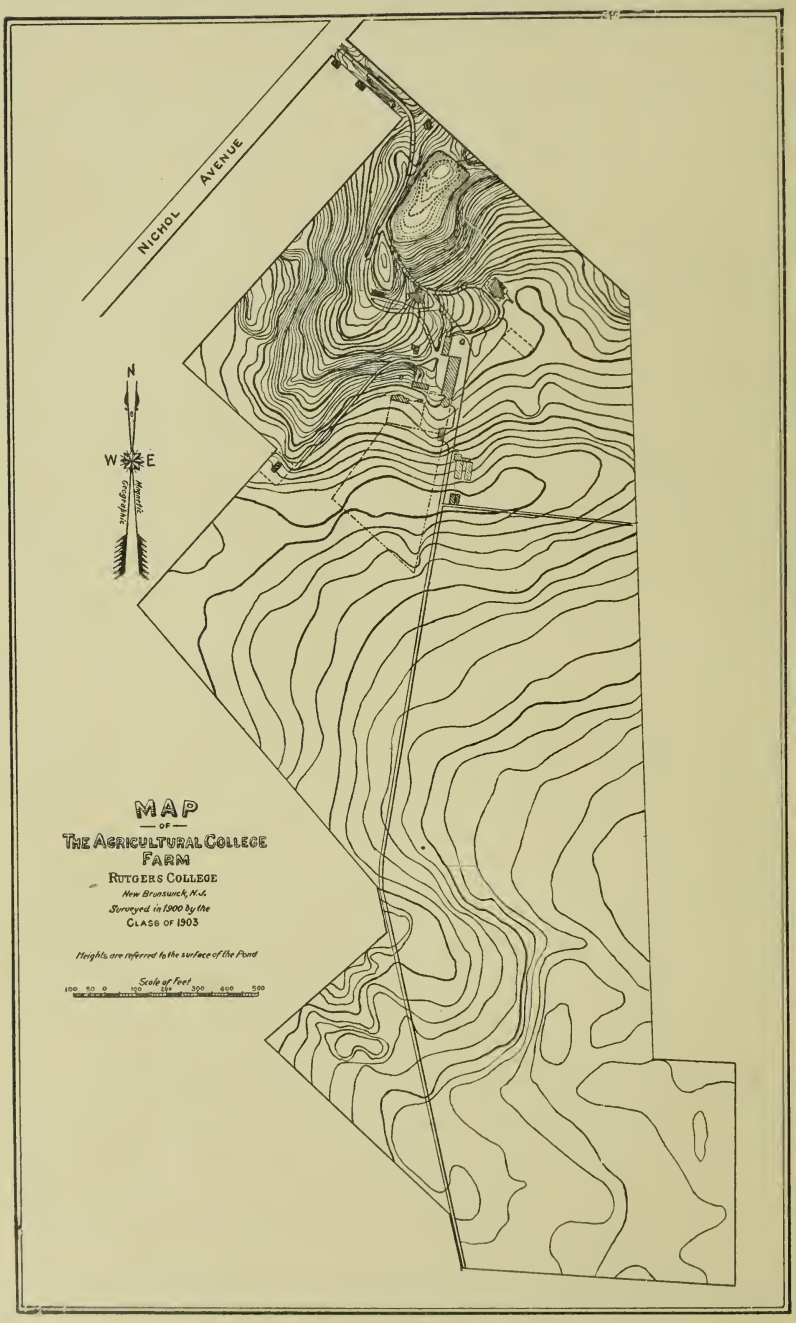
1. Provided that he stand in the first third of the Classical or Scientific Section of his class in the required studies of his course; and,
2. Provided that he be recommended to receive that honor by the Professor or Professors who have instructed him in the elective subject or subjects.

Competition for individual or department honors shall begin where the courses begin to diverge, *i. e.*, with the first term, Junior year, in the Classical School, and with the first term, Sophomore year, in the Scientific School.

DEGREES AND POST-GRADUATE STUDIES.

The Faculty will recommend for the degree of Master of Arts or Master of Science candidates otherwise properly qualified, who, after taking the appropriate Bachelor's degree—

1. Shall pursue for at least one year at Rutgers College a course of liberal and non-professional study, approved by the Faculty, and shall, beside the term examinations, pass a thorough examination on that course and present a thesis on some topic connected with it; or,
2. Who, not less than three years after taking the Bachelor's degree at Rutgers College, shall make application for the Master's degree, presenting at the same time a certificate of graduation from a Theological Seminary, a Law School or a Medical School, or of admission to the practice of Law or Medicine; or,
3. Satisfactory evidence of a thesis (which must be presented to the Faculty at least one month before Commencement) or other proof of successful labor in education or literature pursued during three consecutive years and of advanced studies prosecuted; or,


NICHOL AVENUE
N
W
E
Magnetic Compass
MAP
— OF —
THE AGRICULTURAL COLLEGE FARM
RUTGERS COLLEGE
New Brunswick, N.J.
Surveyed in 1900 by the
CLASS OF 1903
Heights are referred to the surface of the Pond
Scale of Feet
100 50 0 100 200 300 400 500

4. In case of Bachelor of Science, satisfactory evidence of successful professional work actually done and advanced professional studies prosecuted.

The degrees of Ph.D. and D.Sc. may be conferred upon resident graduates of the College who shall pursue for at least two years prescribed courses of study under the direction of the Faculty.

The conditions will be made known on application.

The degree of Civil Engineer is a professional one, and is, on application, conferred upon graduates of the College who have taken the degree of Bachelor of Science, and subsequently have passed three years in the practice and study of engineering, with results satisfactory to the Faculty.

The applicant is required to furnish a statement of the work upon which he has been engaged, and to present a thesis or discussion of some engineering work which he has done. The application and thesis must be presented to the Secretary of the Faculty at least one month before Commencement.

STUDENT SELF-GOVERNMENT.

During the past eight years the College has developed, Faculty and students co-operating, a system of student self-government. In 1893-94 special joint committees of Faculty and students, with equal representation of both bodies, were formed as cases for discipline arose. In 1894-95 the Faculty and students instituted a standing joint committee for the year, consisting of the President of the College, two Professors, two Seniors, two Juniors, one Sophomore, one Freshman. In 1895-96 a standing committee of students only was formed, having the President as presiding officer, with no vote save in case of a tie. This board consisted of four Seniors, four Juniors, two Sophomores and two Freshmen, chosen by their respective classes. In 1896-97 the Faculty, acting upon suggestions made by the student-board, formulated a constitution, which was accepted for the year by the Trustees of the College and by the students. This constitution has been continued under the approval of the Trustees. The names of the members of the student-board will be found in the Register. A resolution of the Faculty of September 28th, 1896, states: "This experience has confirmed the Faculty's trust in the honor and good judgment

of our students, its belief in their capacity for self-government, and in the value of the system as a part of their education in citizenship."

REGULATIONS.

Morning prayers are attended in the College Chapel each morning, except Saturday and Sunday, at 8:40 o'clock.

A Bible class, attendance at which is voluntary, is held Sunday morning in the College Chapel at 10 o'clock.

A sermon is preached every Sunday morning in the College Chapel at 11 o'clock. Students are required to be present.

They are expected, also, to attend public worship in the afternoon or evening, at such place as their parents or guardians may direct.

Excuses for absence from all College duties must be obtained from the Registrar.

Unexcused absences are reported to the Faculty; and a student is not allowed to make up the recitations omitted, but receives zero as a mark.

Recitations, except in Elective subjects, are marked on a scale of 100, and the average standing of each student is made up at the end of each term, and sent to his parent or guardian. A mark at examination counts as much as one-third of the term's work up to the time of examination.

If the grade for the term's work previous to the examination, in any subject, fall below 60 per centum of the maximum, the student will be conditioned in that subject.

If the grade of any student in any study at any time fall below 60 per centum of the maximum, his case will be acted on as the Faculty shall deem necessary.

If any student's average grade in any term fall below 60 per centum of the maximum, he will lose his standing in his class, and be required to fall back a year in the course, unless all his deficiencies shall be removed before the opening of the next term.

In Elective courses the only official statement of work done is the announcement, at the end of each term, in each student's report, that he has passed "high," "medium," or "low," or has "failed." The marks given in elective work are not made public, and do not enter into the ordinary computation of grade. They

serve only for the guidance of the Professors concerned and of the Faculty in determining the Scholarship honors at graduation.

If any student shall be found notably deficient in his daily recitations, or at the examination in any of his studies, his case will be reported to the Faculty, and such action by way of discipline will be taken as may be deemed necessary.

No student can be promoted to an advanced class until all his deficiencies are made up; and if he fail to make up all his deficiencies before the opening of the College year, he will cease to be a member of his class. Examinations for making up such deficiencies are held at 10 A. M. on the Monday and Tuesday before the opening of the session in September.

The Faculty are empowered to pass such regulations relative to the number of boarders in each house as they think proper; and students shall board only at such places as are approved by them.

COLLEGE EXPENSES.

Classical School.

	One Term.	One Year.
Tuition	$25 00	$75 00
Public Room Service (Gymnasium, $6.00; Library, $3.00; Janitor and Fuel, $15.00)	8 00	24 00
Elective Course in Biology, extra	5 00	15 00
Elective Course in Chemistry, extra	5 00	15 00
Elective Course in Physics, extra	5 00	15 00
Elective Course in Astronomy, extra	5 00	15 00
Admission Fee		5 00
Graduation Fee, payable before Senior Final Examinations		7 00
Certificate Fee, payable after a special or partial course		5 00

Scientific School.

	One Term.	One Year.
Tuition	$25 00	$75 00
Public Room Service (Gymnasium, $6.00; Library, $3.00; Janitor and Fuel, $15.00)	8 00	24 00
Draughting-Room Fee, extra after Freshman year	5 00	15 00
Electrical Laboratory Fee, extra	5 00	15 00
Chemical Laboratory Fee, extra	10 00	30 00
Ceramic Laboratory Fee, extra	10 00	30 00
Biological Laboratory Fee, extra	5 00	15 00
Admission Fee		5 00
Graduation Fee, payable before Senior Final Examinations		7 00
Certificate Fee, payable after a special or partial course		5 00

All College bills are payable within ten days after the beginning of each term. All checks should be made payable to the Treasurer of Rutgers College.

For information in regard to rooms and board in Winants Hall, see page 102.

Students in the Scientific Courses are required to procure sets of draughting instruments, costing from $10 to $20. They are advised to defer the purchase of these instruments until entering College, as they will then have the advantage of procuring them under the direction of the Professor of Draughting.

Students pursuing the course in Chemistry and the course in Electricity are expected to provide themselves, at their own expense, with the necessary sets and pieces of apparatus, which may be obtained from the regular apparatus dealers or from the Laboratory Supplies department. These sets are retained through the year, but at the end of it, if the owners do not wish to keep them, they will be purchased at a fair price. If proper care has been exercised, a small discount only (about 10 per cent.) from the original cost will be made. All breakage and damage to College apparatus will be charged in full.

BLODGETT FELLOW IN SCIENCE.

Mr. James H. Blodgett, of Washington, D. C., has given to the Trustees $1,200 for the encouragement of advanced study in the Rutgers Scientific School. Whenever the accumulated income from this investment shall amount to $200, that sum is to be paid in quarterly installments to a graduate of Rutgers holding the degree of B.Sc., who shall be selected by a committee appointed by the Faculty and who shall be designated as Blodgett Fellow in Science. The holder of this Fellowship shall prosecute graduate studies in the Scientific School for one year; shall render assistance to the Professor having the direction of such studies, and for that service shall be exempt from the payment of all fees.

PRIZES.

In every case where it is expected that a prize will be awarded for work done, it is distinctly announced that, unless in the opinion of the examiners the work submitted is of such excellence as to merit a prize or prizes, no prize will be awarded.

Whenever a prize requires both an essay and an examination, the essay must be handed in before the hour fixed for the examination.

All prizes are open equally to members of the Classical and Scientific Schools, except in cases where they are specially limited to one school by the donor. Each competitor for a prize must sign a written declaration that the essay or other work offered by him is his original and unaided work. The essays are to be written on a paper of a prescribed kind, and the successful essay is to be deposited in the College Library, before the writer is entitled to the prize.

Suydam Prize for Composition.

This prize, the gift of JAMES SUYDAM, Esq., is a gold medal of the value of twenty-five dollars, or that sum in money, and is to be awarded to the member of the Senior Class who shall write the best English Composition on a subject assigned to the class.

Subject for 1904: "The Pre-Raphaelite Movement in England."

Suydam Prize in Natural Science.

This prize, the gift of JAMES SUYDAM, Esq., is a gold medal of the value of twenty-five dollars, or that sum in money, and is to be awarded to the member of the Senior Class who shall have made the highest attainment in Natural Science. The examination is upon all the subjects of Natural Science in the College course, Astronomy, Biology (including Physiology and Zoology), Botany, Chemistry, Geology and Physics, and is conducted by the Professors of those subjects. The questions and answers are required to be written.

Bradley Mathematical Prize.

This prize was established by the late Hon. Joseph P. Bradley, LL.D., Class of 1836, and is maintained by his son, Charles Bradley, Esq., of the Class of 1876. It consists of a valuable Mathematical work, which is to be bestowed on the student of the Senior Class who shall present the best solution of a set of Mathematical problems to be proposed to the class by the Professor of Mathematics before the close of the second term.

Myron W. Smith Memorial Prizes for Declamation.

These prizes were founded by Lyndon A. Smith, M.D., of Newark, in the name of his son, Adjutant Myron W. Smith, who was a graduate of the College in the Class of 1858, and who gave his life in the Civil War to the cause of his country. They consist of the interest of $500 (twenty-five dollars), proportionately appropriated to two medals, one of gold and the other of silver, which are to be awarded respectively to the best and second-best speakers of the Sophomore Class. Only those students who shall have pursued, in the College, the regular studies of the Classical or a full Scientific course from the beginning of the Freshman year, shall be allowed to contend for these prizes.

The competition for these medals shall take place before a committee of the Faculty, when the best and second-best speakers shall be selected, to whom the medals shall be awarded, and six others shall receive honorable mention in their order of excellence. The medals shall be presented at Commencement.

Tunis Quick Prizes in Spelling and in English Grammar.

This prize, the gift of the late P. Vanderbilt Spader, Esq., of New Brunswick, is the income of $300, at 5 per centum, and is to be presented to that member of the Freshman Class, Classical or Scientific, who shall pass the best examination in Spelling and in English Grammar.

The examination is to be conducted in writing by the Professor of English Literature, at as early a day as convenient in the second College term, and under such regulations as the Faculty may from time to time establish.

The prize may be withheld from any and all papers offered, either for want of merit or for failure of proper competition. In case the prize be not awarded in any year, it is to be offered one year later to the members of the same class, on the same conditions as at first.

All regulations as to time, manner and conditions of awarding the prize, are subject to change by the Board of Trustees.

Peter Spader Prizes in Modern History.

These prizes, the gift of the late P. Vanderbilt Spader, Esq., are two in number, the income of $400 and $300, respectively, at 5 per centum, and are to be awarded to those members of the Sophomore Class, Classical or Scientific, who shall present the best essays on some subject in Modern History, selected by the Professor of History, with the approval of the Faculty.

The subject is to be announced at the close of the Freshman year, and the competing essays are to be handed in on or before the last Monday in May of the Sophomore year.

The committee annually appointed by the Faculty may decline to award these prizes, or either of them, for want of merit in the essays, or for failure of proper competition. In case the prizes be not awarded in any year, they are to be offered one year later to the members of the same class, on the same conditions as at first.

All regulations as to time, manner and conditions of awarding the prizes are subject to change by the Board of Trustees.

Subject for 1904: "Patriotic Literature of the Revolution."

Appleton Memorial Prize in Moral Philosophy.

This prize is founded by a gift of $500, from the Rev. Samuel E. Appleton, D.D., in the name of his mother, Mrs. Elizabeth Appleton. It consists of twenty-five dollars, the interest of the above sum, and will be given "to the members of the Senior Class who shall pass the best examinations in Moral Philosophy."

For 1904: (*a*) Examination upon Ladd's "Philosophy of Conduct," Part I.

(*b*) Subject for essay: "The Nature of the Right."

Bowser Engineering Thesis Prize.

This prize was established by Professor Edward A. Bowser, LL.D., in 1875. It consists of Mathematical or Engineering works of the value of twenty dollars, or that sum in money, and is awarded to that member of the Engineering Section of the Senior Scientific Class who shall present the best thesis upon some Engineering subject at graduation.

John Parker Winner Memorial Prize in Mental Philosophy.

This prize consists of twenty-five dollars, given by John Winner, Jr., and his wife, in memory of their deceased son, John Parker Winner. It will be open to competition for students in both the Classical and Scientific Sections who are pursuing the study of Mental Philosophy, and will be bestowed on the one who shall pass the best examination on some work assigned by the Professor of Metaphysics.

For 1904: (*a*) Examination upon Janet's "Final Causes," complete.

(*b*) Subject for essay, which shall consist of not less than 3,000 words: "Regressive Proof for Finality."

William H. Van Doren Prize for the Best Essay on Christian Missions.

This prize consists of twenty dollars, the gift of the Rev. William H. Van Doren, D.D. It is open to competition for members of the Senior and Junior Classes in both sections, and for members of the Theological Seminary.

Subject for 1904, essay limited to 3,000 words: "The Missionaries in China During the Boxer Rebellion."

Junior Exhibition.

Eight members of the Junior Class in the regular courses are chosen each year, on account of their abilities in Composition and in Elocution, who deliver original speeches at an exhibition held on the evening preceding Commencement. The selection is made

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by a committee of three persons appointed for that purpose by the Faculty.

A prize of twenty-five dollars, the gift of RALPH N. PERLEE, Esq., of New York City, is awarded by a special committee at the time of the exhibition to that orator who shall be adjudged the best writer and speaker among the contestants.

The Bussing Prizes for Extempore Speaking.

Mrs. ANN VAN NEST BUSSING, of New York City, has given to the College $1,000, the income of which (fifty dollars per annum) is to be expended each year for books, which shall be selected by the President of the College, and given as follows: The First Prize, of thirty dollars, to that member of the Senior Class who shall prove himself to be the best extemporaneous speaker; the Second Prize, twenty dollars, to the second-best extemporaneous speaker of the Senior Class. The prizes are to be awarded by the Faculty of the College or by a committee whom they shall name, and shall be awarded after a public debate to be held in the latter part of the College year. In awarding the prizes, "strict attention shall be given to logical and forcible presentation of thought, full and accurate information as to matters of fact, and grace and effectiveness in delivery." For the sake of training students in the clear expression of intelligent thought upon matters of public interest, each class has an exercise in extempore speaking twice in each term. The subject is announced to the class, and, after five minutes for thought, the members of the class discuss the subject or debate the question before a committee.

Van Vechten Prize—Essay on Christian Missions.

A. V. W. VAN VECHTEN, Esq., of New York City, founded in honor of his mother, the late LOUISA VAN VECHTEN, and his father, Rev. SAMUEL VAN VECHTEN, D.D., a prize of sixty dollars, by the gift of $1,000, the prize "to be given annually to that student of Rutgers College who shall be adjudged by the Faculty of the Theological Seminary of the Reformed Church

of America, at New Brunswick, to have presented an article, original with himself, and the best submitted—the most conclusive and inspiriting to strengthen faith in and love for Foreign Missions." The essays are limited to 3,000 words, and are to be presented on or before May 1st of each year.

Subject for 1904: "Modern Missionary Methods Compared with Mediæval and Apostolic."

The Class of 1876 Political Philosophy Prize.

The Class of 1876 have given the College one thousand dollars ($1,000) as the foundation of a Prize Fund (which they express the hope that they may increase from time to time, until it shall be sufficiently large to establish a fellowship), for the encouragement of the study of Political Philosophy. The income of this fund is to be awarded each year "to that member of the Senior Class (either Classical or Scientific) who shall be adjudged entitled to it, * * * on the basis of an original essay on some subject in Political Philosophy, assigned by the Professor of that science in the College, and upon a competitive examination in a text-book also selected by him;" the committee of award to consist of "three competent persons selected by the Faculty of the College, at least one member of the committee to be a member of th Class of 1876 as long as any may be living."

For 1904: (*a*) An examination upon Freeman: "Comparative Politics."

(*b*) Subject for essay: "Methods of Colonial Control in Modern Times."

Luther Laflin Memorial Prizes in Metaphysics.

These prizes are given by Luther Laflin Kellogg, Esq., of New York City, in memory of his grandfather, Luther Laflin, deceased.

A first prize of one hundred dollars and a second prize of twenty-five dollars will be open to students of either the Junior or the Senior Class in the Classical School, and will be bestowed

on the one who shall pass the best examination on some work and shall submit the best essay on some theme assigned by the Professor of Metaphysics.

For 1904: (*a*) An examination upon Aristotle's "Metaphysics," in Greek, complete.

(*b*) Subject for essay, not less than 4,500 words: "Development Impossible Without Transcendent Supervision."

Barbour Prizes in Speaking.

These prizes, two in number, of the value of fifteen dollars and ten dollars, respectively, are offered by the Instructor in Elocution. The eight members of the Freshman Class of either section in regular course who shall stand highest in Elocution during the entire year may compete before a committee appointed by the Faculty.

Scientific Prize in Logic ($50).

Open to Scientific Students in full standing only.

For 1904: (*a*) Examination upon Hoffding's "History of Modern Philosophy," Vol. II., entire, and "The Theory of Thought: A Treatrise on Deductive Logic," by N. K. Davis.

(*b*) Subject for essay, not less than 4,000 words: "Analogy Between the Logical Discovery of the Middle Term and the Quantitative Approach to Absolute but Unknown Values."

Honorable Mention for Work Outside the Course Done Without Reference to a Prize.

For the encouragement of independent reading and study and original investigation, under the direction of the Faculty, honorable mention is made of students who give evidence of thoroughness in such work and pass a satisfactory examination.

BUILDINGS AND EQUIPMENT.

Queen's College.—Erected 1808-1809. This building occupies the central portion of the group of College buildings. It contains nine recitation rooms, a commodious lecture-hall and the offices of the President and of the Registrar.

The Henry Janeway Weston Memorial Collection of books, engravings and curios relating to Napoleon I. is deposited in this building in a room fitted for the uses of the students, particularly those pursuing certain elective courses in history. This valuable collection was given by the late Mrs. Katherine Weston, who also furnished the room, and at her decease left a sum to provide for its maintenance.

The Fine Arts Building.—Erected 1841-1842. The residence of former Presidents of the College has been refitted for the uses of the Fine Arts Department of the College, and is known as The Fine Arts Building. It contains the art collections of the College, including "The Thomas L. Janeway, M.D., Memorial Collection" of casts and photographs, and the various gifts of friends of the institution.

The pictures, models, casts and photographs are arranged to represent, as far as possible, the art of the world. A new lecture-room, having adequate facilities for illustrating lectures by the stereopticon and otherwise, is in use, and the arranging and classifying of the Museum is going forward. Acquisitions are being continually made to the Museum, and every facility for illustrating the history of art is being added to the department. Besides the lectures of the Professor in charge, subjects related to the fine arts will be treated from time to time by other lecturers.

The Thomas L. Janeway, M.D., Memorial Collection to illustrate Classical Archæology, is the gift of the heirs of Dr. Thomas L. Janeway, of the Class of 1863.

It already includes (1) eight casts from marbles typical of the chief periods in the history of sculpture. These casts were manufactured by Brucciani & Co., of London. (2) Five hundred casts from engraved gems (cameos and intaglios) and coins,

Greek and Roman. These were selected with an eye both to the study of the development of the art and to the especially full illustration of its achievements. The workmanship on these casts is that of Augustus Ready, of the British Museum. (3) Eight hundred stereopticon slides, of which all but eighty-two were made by the well-known Levy, of Paris. (4) One thousand photographs and restorations. Among the photographs are Bonfils, of Beirut; Sommer, of Naples; Anderson, of Rome; Mansell, of London; Lombardi, of London; Quaas, of Berlin; Hautecœur, of Paris.

The collection, made in Europe by a member of the College Faculty, is designed to illustrate the topography, art, life and literature of Ancient Greece and Rome, and for this purpose is used constantly by College classes.

Van Nest Hall was erected in 1845, and named for Abraham Van Nest, Esq., a liberal trustee, in recognition of his services and gifts to the College.

In 1893 it was beautified by the addition of a stone porch, the gift of Mrs. Ann Van Nest Bussing, daughter of Abraham Van Nest, who at the same time refitted the eastern portion of the second story into a handsome hall for the regular and occasional exercises of the students in Elocution.

During the same year the Trustees added a third story to the original building, thus creating a large and well-lighted room for the use of the classes in Draughting. On the second floor is another room for the advanced work in Graphics.

The rooms of the Peithessophian and Philoclean Literary Societies on the first floor have been thoroughly refitted, and are, for the present, devoted to the uses of the Young Men's Christian Association and the department of the English Language and Literature.

The building also contains the collections for illustrating the instruction given in the Engineering courses, comprising a great variety of models showing details of construction in wood, iron and stone, with a full set of Schroder and many Olivier models in Descriptive Geometry, besides blue prints, working drawings and lithographs of roof and bridge trusses. A complete outfit of Engineering and Surveying instruments is owned by the College for the use of the students in the Surveying classes.

The Daniel S. Schanck Observatory, erected in 1865, is a two-story brick building with revolving dome, constructed especially for astronomical work. It contains in the main part the equatorial refracting telescope, mounted on a pier of solid masonry extending several feet below the surface of the ground and detached from the floors through which it rises, so as to be unaffected by the tremors of the building. The telescope is eight feet four inches in focal length, with an aperture of six and one-half inches, and was made by the late Henry Fitz, of New York. It has a small telescope attached for a finder, a driving clock, a position micrometer, a number of eye-pieces of various powers, ranging from 50 to 600, and a solar attachment for the study of sun-spots. The declination circle is ten inches in diameter, reading by verniers to one minute of arc, and the hour circle, seven and one-half inches in diameter, reads by verniers to six seconds of time.

On the west side of the main part is an extension for transit observations. The meridian circle used for this work was made by Stackpole, of New York, and has an object-glass four inches in diameter and four feet ten inches in focal length, with circles seventeen inches in diameter, reading by two microscopes with micrometer screws to single seconds of arc. The diaphragm carries one horizontal and seven vertical wires. There is also a striding spirit level and an apparatus for reversing the axis of the instrument. The bearings rest on two stone pillars supported by piers of masonry.

The observatory has also a sidereal clock, by Wm. Bond & Son, the gift of John Clark, Esq., of New Brunswick, with an electrical break-circuit; a mean solar clock, the gift of the Peithessophian Society of Rutgers College, and a reflecting circle, the gift of the Philoclean Society of Rutgers College, and several barometers and thermometers.

The whole building and the instruments are illuminated by the electric light. The observatory is used in connection with the course in general astronomy to give knowledge of the sun, moon, planets, etc. Those who elect Mathematics and Astronomy receive instruction in the use of the instruments and take part in the observations. Post-graduate students can take a still more extended course.

The longitude of the observatory is $0^h\ 10^m\ 28.75^s$ east of the new Naval Observatory, Washington, D. C.

The latitude is 40° 29′ 57.6″ N.

Geological Hall.—Erected 1871. The Physical Department occupies seven rooms on the main floor and three in the basement. There are two lecture-rooms, an apparatus-room, a general laboratory, one laboratory for work requiring even temperature, a battery-room and an office.

The lecture apparatus comprises the usual instruments. The laboratories contain general apparatus, such as dividing engine, a set of United States standard weights and measures, metric standards, spherometer, plainimeter, etc. Among the special apparatus are a steam engine, a gas engine, electric motors of various patterns, a storage battery, a model Edison three-wire plant of about two hundred lights capacity, a full set of electrometers, galvanometers and rheostats. The reference-books most frequently consulted are kept in the rooms of the department, ready for instant use.

In the large exhibition-room in Geological Hall the various collections in Natural History are displayed. Through the indefatigable perseverance of the late Dr. George H. Cook, who was especially interested in this side of the College equipment, very valuable collections have been secured, illustrating all branches of Geology and Mineralogy.

The collection in Lithology is quite complete, all the well-known rocks being illustrated. The rocks of Europe and America are particularly well shown. There is a very fine collection to illustrate Palæontology, which, while it well covers the whole subject, is especially rich in the fossils of this State. These two collections occupy the cases on the west side of the room. The large collection of shells, to illustrate Conchology, is displayed to good advantage in a series of table cases in the gallery. The collection of minerals occupies the cases on the east side of the room, and is quite full, though there are still many gaps in it. The varieties found in this State are well represented. Two cases at the north end of the room are filled with specimens of stone implements and ancient pottery, many of which have been found near New Brunswick, and which illustrate prehistoric

Anthropology. This collection is in large part the gift of the Rev. John H. Frazee, D.D., after whom it has been named. Two large central cases contain the Beck Collection of Minerals, and two others are filled with the rocks, clays and iron ores of New Jersey.

A mastodon from Salem county, which has been recently set up by H. A. Ward & Co., of Rochester, N. Y., through the liberality of the Hon. Henry W. Bookstaver, occupies a prominent position near the north end of the room and is one of the finest specimens in the world.

During the past few years a systematic arrangement of these collections has been made. All have been carefully and completely arranged and labeled in such a way that they can be conveniently studied. Each label gives the donor's name whenever it can be ascertained.

Donations are solicited from friends of the College to increase its collections and to aid in the illustration of any of the subjects taught.

The Kirkpatrick Chapel and Library, erected in 1872, is built of brownstone, in the French Gothic style of the Fourteenth Century. The auditorium is attractive, having a roof of open timber, finished in black walnut and stained pine. On the walls hang numerous portraits of former officers and benefactors of the institution. It has a seating capacity of 350 persons.

Back of the Chapel is a large room designed for the President's classes, and adjoining is the assembly-room for the Trustees. Above these rooms is the Library.

Library.—The Library of the College, containing 45,655 volumes, is open for consultation during each week-day from 8 A M. to 4:30 P. M.

Students are allowed free access to the books and are encouraged to become familiar with the proper methods of using a library for literary work.

In 1887 the late P. Vanderbilt Spader, Esq., of New Brunswick (a member of the Class of 1849), gave to the College his personal library, valued at $15,000 and consisting of about 5,000 books, among them many very valuable art volumes, and collec-

THE ROBERT F. BALLANTINE GYMNASIUM RUTGERS

tions especially rich in State and local history, and in books of reference. By his will the College has received $10,000, the income of which is to be expended for the maintenance and increase of the P. Vanderbilt Spader Library Gift.

By the gift of a permanent fund of $1,000 from James Suydam, Esq., supplemented by gifts from other sources, the library is supplied with the leading periodical publications in the various departments.

By the courtesy of the Theological Seminary of the Reformed Church, the Sage Library of more than 40,000 volumes is open to the students of Rutgers College for consultation; and under certain limitations books are drawn from it as well. It is within four minutes' walk of the College campus.

The State Laboratory of the New Jersey Agricultural Experiment Station was authorized by an act of the Legislature approved April 23d, 1888. It affords accommodations for the uses of the State and Agricultural College Stations, and by the courtesy of the Board of Managers of the State Station, who also constitute the State Board of Visitors to the Agricultural College, for the laboratory and class-room work of the students of the Agricultural College who are pursuing the regular and special courses in Agriculture, Chemistry and Biology.

The Agricultural and Biological (Botany, Entomology, Zoology) departments have an equipment for purposes of instruction, consisting of—

(*a*) College Farm equipped with modern farm buildings and arrangements, improved farm implements, including corn harvesters, potato-diggers, seed-planters, engine and boiler, cutters and crushers for fodder, hay loaders and mowers. The dairy is equipped with the leading cream separators, milk coolers and bottles, Babcock tester, etc.

A poultry-house has recently been erected, which is provided with incubators and adequate facilities for experiments in the breeding and care of fowls.

In the early summer of 1895 an irrigation plant was placed upon the farm, designed to supply the water needed by vegetables and fruits on at least ten acres.

The barns and other buildings are modern in their construction, and serve as models of convenience and in economy of space. The equipment is of the most modern type, including all of the necessary tools and implements required for intensive farm practice. The livestock includes representatives of the leading breeds of horses, dairy cattle, swine and poultry. The intensive system is practiced; it includes soiling, green manuring, and all the natural and artificial aids necessary, in continuous cropping, to secure maximum yields. A special study is made of forage crops for the dairy, and all the leading crops in this group are grown.

The farm is, on the whole, an object-lesson, not only in modern and profitable practice, but in showing the economical manufacture of crude crop material into high-class products, as milk and cream, for which all the modern appliances are used. During the year ending April 1st, 1902, there was produced an average of 8.1 tons of forage from each acre of the 70 under cultivation, which served as the basis of the ration fed to 30 dairy cows, which produced 96,659 quarts of milk and cream. Business methods are observed throughout.

On the experimental areas, the leading varieties of fruits, berries and vegetables are grown, and scientific methods of fertilizing, manuring and cultivating are used. The plant-houses also afford opportunity for a study of forcing methods.

The Department has recently been enriched with 25 paintings, from photographs of the leading animals of the various dairy and beef breeds of cattle. Models of farm buildings, illustrating the best methods of construction, besides those illustrating various interior arrangements, as stalls for horses and cattle, are also available.

(*b*) Laboratories, with separate rooms for Botany, for Entomology and for Zoology, equipped with tables, accessory microscopic apparatus, historical reagents, microtomes, material for dissection, eighteen compound microscopes (Reichert's and Leitz's, and Bausch and Lomb's make), giving powers up to 800 diameters; also many dissecting microscopes.

(*c*) Auzoux Models, illustrating the structure of Man, Cow, Bird, Reptile, Fish, Snail, Starfish, Ascidian, Medusa, Worm, Insects (Cockchafer, Silkworm larva and moth, Honey-bee and its work) and Plants (various flowers, fruits and fungi).

(*d*) Charts (including many of Leuckart's charts), illustrating the various parts of the living world; also many photographs and lantern slides.

(*e*) Cabinets; a collection of slides illustrating histology and the anatomy of minute animals, especially the insects; also a collection of 5,000 species of insects systematically arranged; also a collection of nearly 25,000 plants.

(*f*) Museums; a collection of stuffed animals and alcoholic specimens systematically arranged, 60 large boxes containing a collection of injurious insects and examples of their work, a systematic collection of over 5,000 species of American insects, preparations of pathological plant specimens, a collection illustrating the biology of the oyster, its messmate and enemies, and a fine, systematic collection in Conchology.

(*g*) Besides this equipment for direct instruction, the student has brought under his observation the equipment of the research laboratories of the experiment stations in working operation, such as the processes and instruments used in the study of milk, soils, fertilizers, bacteria, mychology, micro-photography, insecticides, fungicides and other experiments relating to agriculture.

The facilities for teaching Chemistry are fully equal to the demands. The two laboratories furnish abundant room to the students, and are equipped with filter-pump, water-blast and tables for organic analyses, besides the ordinary facilities found in all laboratories. An adjoining room has been fitted us as a department library, in which are standard works of reference and the important chemical journals on file. The students are encouraged to spend all spare time in this room. The lecture-room is abundantly lighted and the table well fitted for experimental lectures. Special pieces of apparatus are constantly acquired, particularly to illustrate the more difficult points in the new developments of Chemistry, and for investigation. The collection to illustrate the lectures on Applied Chemistry is growing. Contributions are earnestly solicited.

Ceramics Building.—The equipment is housed in a commodious laboratory especially adapted and arranged for the purpose. This building is located on College property adjacent to the campus. The front of the main portion is of the Colonial style, plainly but well executed in buff brick.

The workshop contains nearly 1,700 square feet of floor space, which provides an admirable place for the machinery installed. Here is located the 30 h.p. electric motor. The power is distributed by two lines of shafting furnished with split steel pulleys.

The brick-making outfit consists of an auger brick machine of a capacity of 20,000 brick a day, a horizontal pugmill and a down-cut board delivery table. Appliances for the potter and the tile-maker also find a place in this shop. The machinery for that purpose consists in part of the following articles: A dry pan or grog-mill arranged for wet and dry grinding, a clay-mixing and preparing machine or a combined blunger, agitator, lawn-screen, filter-press and slip-pump with a capacity of 500 to 1,000 pounds a day, a four-jar glaze-mill, a large-size ball-mill, a combination pull-down and jigger combined, a potter's pug-mill, a wad-machine, a hand-jigger, sieving machinery, a tile-press and other necessary appliances, all of the latest design and representative of the chief types in the manufacture of a wide range of wares.

In an adjacent room is a wet closet built of porous brick with a terra cotta lumber ceiling. The outside is covered with a coat of cement. In this room may be stored unfinished clay wares, which may be kept damp for a long period.

A kiln has been provided which is sufficiently large to hold a quantity of wares of various sorts. It is so constructed as to be used either as an up-draught or a down-draught, thus representing the two chief types. Frit furnaces and an improved Segar furnace are also at hand. A Le Chatelier pyrometer and Segar cones have been purchased for use in study of the phenomena associated with high temperature.

In an upper room is placed an extensive library containing the most important literature on clays and clay-working. This literature represents the best thought of French, German, English and American investigators.

A collection of ceramic wares is in process of installation. Suitable cabinets have been arranged for containing this collection.

Inasmmuch as this department is required to perform the two-fold function of a school for instruction and a laboratory for investigation, a room has been set apart for the use of the Director. It is furnished with the usual fixtures and scientific apparatus.

The Ralph Voorhees Library—erected in 1902-1903—is the gift of Ralph Voorhees, Esq., of Clinton, N. J.

The exterior of the building reflects the spirit of Queen's College, which was designed by Mr. McComb, the architect of the beautiful New York City Hall. Following the example of the Trustees at the time of the construction of Queen's College, their successors in the Board determined to build the outer walls of this library of stone, and chose the Long Meadow (Mass.) stone of a reddish-brown tone to accord as far as possible with the color of the stone used in Queen's. The basement and first floors are thoroughly fireproof. Above the first story the building is practically fireproof, the walls and ceilings being either of brick or of plaster on wire lath supported on iron frames. In devising the plan, effort was made to make the building with as few fixed interior walls as possible in order that there may be no obstruction to the development of the library. The stack-rooms may be increased indefinitely toward the north, and the reading-rooms to the east and west, without materially affecting the design. The building, as planned, will accommodate more than 100,000 volumes, some 50,000 of which will be placed on the main floor. Small study-rooms will be formed on each story of the stack-rooms.

Access to the Library is had from two doorways, which are under immediate supervision from the desk of the Assistant Librarian. Passing through lobbies, the entrance is direct into a rotunda thirty-seven feet in diamater, with a low dome and lighted by a large central skylight. Opening directly out of this rotunda, east and west, are two reading-rooms, twenty-five by twenty-eight feet each, with elliptical barrel vault ceilings and lighted on three sides by large windows above bookcases, which extend around three sides of each room. The Librarian's room and a cataloguing-room are on the front of the first story. Over these are a room for the President and Trustees and a lecture-room. A large fireproof vault is provided in the basement. The building is heated and ventilated by a steam indirect radiation system with auxiliary direct heating, as may be required.

Funds for the furnishing of the building have been secured and it is expected that this work will progress rapidly.

For a description of the old library and contents, see page 96.

Winants Hall—Dormitory—Erected in 1890. This building serves as a dormitory and refectory for such students as choose to lodge and board at the College. It accommodates 100 students. The rooms are arranged in suites of a study and two sleeping-rooms, for two and three room-mates, and there are a few single rooms. Special attention is given to light, ventilation and sanitary appliances and to the necessary quiet retirement and privacy of the students.

Ample provision is made for fire-escapes and other securities against accidents.

The entire building is heated by steam. Bath-rooms, lavatories and store-rooms are on each floor.

The large study-rooms are each furnished with two study-tables and two chairs. The bed-rooms are each furnished with a solid oak set, consisting of bedstead (springs and mattress), bureau and washstand. The remaining furniture, such as sheets, pillows, pillow-cases, coverlets, towels, bowl and pitcher, etc., are to be supplied by the occupant. The schedule of prices for single rooms and suites of rooms includes heat and gaslight.

In drawing for choice of rooms, the order of classes will be followed, precedence being given to the Seniors.

Rooms are to be taken for the full year. Rent is payable in advance, one-third at the beginning of each term. Agreement to pay rent is for the entire suite, and must be signed by the student who draws it, or his guardian. Rooms may be occupied from the Monday preceding the opening of the College year to the Saturday following Commencement.

During the present year board is furnished by the matron at $3.50 a week.

The drawing for choice of rooms for the year 1904-1905 will take place in the Registrar's office on Wednesday, June 8th, 1904, at 2:30 p. m.

SCHEDULE OF PRICES A WEEK OF ROOMS IN WINANTS HALL FOR 1904-1905.

The following schedule gives the weekly rental for each occupant of the respective rooms, and no more may occupy any suite than is indicated in parentheses after the room numbers. One student occupying a double room, or two students occupying a room intended for three, will be charged the full rental for the suite:

$1.00—11 (1), 15 (1), 16 (1), South, First Floor; 116 (1), 117 (1), 121 (3), North; 127 (3), South, Fourth Floor.

$1.25—5 (3), North; 9 (2), 20 (2), South, First Floor; 118 (2), North; 132 (2), 135 (1), 136 (1), 137 (2), South, Fourth Floor.

$1.50—70 (3), 76 (1), 77 (1), 81 (3), North; 102 (3), 113 (3), South, Third Floor.

$1.75—23 (3), 29 (1), 30 (1), 34 (3), North; 55 (3), 66 (3), South, Second Floor; 108 (1), 109 (1), South, Third Floor; 124 (2), Middle; 140 (1), North, Fourth Floor.

$2.00—61 (1), 62 (1), South, Second Floor; 87 (2), 90 (2), 96 (2), 97 (1), 99 (1), Middle, Third Floor.

$2.25—2 (2), North; 12 (2), 17 (2), South, First Floor; 40 (2), 43 (2), Middle, Second Floor; 73 (2), 78 (2), North; 105 (2), 110 (2), South, Third Floor.

$2.50—26 (2), 31 (2), North; 58 (2), 63 (2), South, Second Floor.

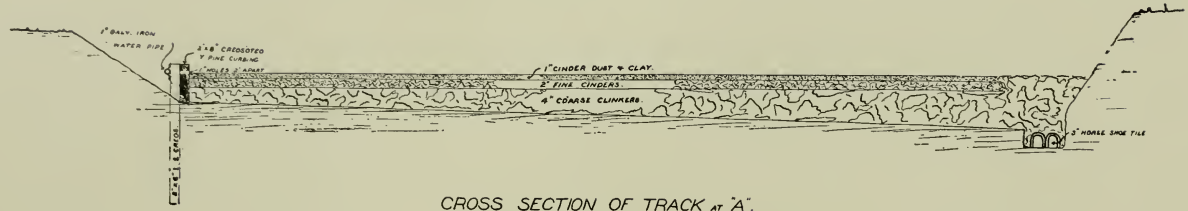
It will be seen from the foregoing statements and schedule that board, lodging, heat and light may be had in Winants Hall at a cost varying from $4.50 to $6 a week.

The Robert F. Ballantine Gymnasium.—By the generosity of Robert F. Ballantine, Esq., of Newark, N. J., a Trustee of the College, a building was completed in 1894 which affords unexcelled opportunities for physical instruction and exercise, and for military inspection and drill. This Gymnasium is situated on spacious grounds given to the College by another Trustee, James Neilson, Esq., of New Brunswick. The building is in two parts, the front portion being devoted to purposes of administration, and the rear the gymnasium and drill-room proper. Ample offices are

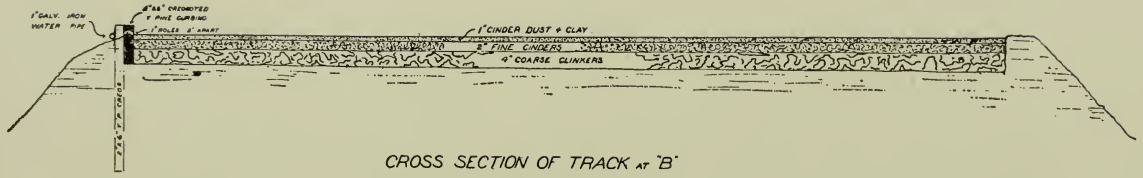
provided for the instructor in military science and the instructor in physical culture. The gymnasium and drill-room combined afford an unobstructed space one hundred feet by sixty in dimensions. The apparatus is of the most approved kind, and was chosen by the director of one of the best systems of physical instruction in the country. Suspended from the truss-roof is a running-track two hundred and eighty feet in length. Space is also afforded for the armory of the Scientific School. On the one side of the administration building is a large room for lockers, on the other side a room for military equipments. On the floor above, apartments are provided suitable for all the uses incident to these purposes. In the basement are a swimming-tank, shower and needle-baths, a ball-cage, and four bowling-alleys of perfect construction.

The building is a fine specimen of the colonial style of architecture.

Athletics.—In order to secure for the students the benefits of out-of-door exercise, athletic sports are encouraged by the provision of adequate facilities. Rightly controlled, such sports have shown themselves beneficial both to the health of the students and to the quality of the work done, and are manifestly in the interest of good order. The more prominent athletes have been generally among the more earnest and successful students. The proper control of athletics has been secured by the organization of an incorporated Athletic Association, supported by the students and controlled by a board of nine Trustees, chiefly composed of resident alumni. In this board the Faculty has always had one or more representatives. Details in the conduct of athletics are in charge of a Board of Managers, which meets once a month during the College year. This board is composed of a representative of the Faculty, three alumni, three undergraduates, together with the President and Treasurer of the Association, the Chairman of the Board of Trustees and the Physical Director of the College *ex officio*. In this way a cordial co-operation has been steadily maintained between Faculty and students, avoiding the need for the exercise of direct authority.



CROSS SECTION OF TRACK AT "A".



CROSS SECTION OF TRACK AT "B"

Students are required, before enrollment, by the manager of an athletic team or organization, or before entering their names for match contests, to secure from the Instructor in Physical Training a certificate, good for the current College year, stating that the candidate is physically fit for such contests.

The Athletic Field.—By the generosity of James Neilson, Esq., of New Brunswick, an alumnus and Trustee of the College, there has been provided an athletic field, containing more than five acres and at a walking distance of about eight minutes from the College campus.

About five thousand dollars was spent in improving this field and providing proper accommodations. It is furnished with a commodious grand-stand, with dressing-rooms and bath-rooms attached, and with everything to make it as nearly perfect as possible and to render it practically useful to the students.

Additional improvements have been made at a cost of about $2,000. A new quarter-mile running track has been constructed after the best models, new and additional bleachers have been erected, and the inner field has been separated from the space allotted to spectators by a picket fence, running along one side of the field.

The Boathouse.—With funds secured from the undergraduates, alumni and friends of the College, a commodious boathouse has been built, conveniently situated for the use of those interested in boating.

REGISTER.

1. SOPHOMORE ORATORS, CLASS OF 1904.

In the order of their appointment according to merit.

Welcome William Bender,
Harry Baremore Angus,
James Gilbert Mason, Jr.,
Robert Weeks Cobb,
Herman Terhune Hopper,
Simon Blocker,
James Howard Brinckerhoff,
Charles Parker Wilber.

2. JUNIOR ORATORS, CLASS OF 1903.

Junior Exhibition, June 16th, 1903.

William James Douglas, Jr.,
Emil Eisenhardt Fischer,
William Kenneth Flanagan,
Frederick William Gaston,
John Mellor,
Frederic Alton Price, Jr.,
Martin Luther Schenck,
Charles Wagner.

3. GRADUATING EXERCISES, CLASS OF 1903.

Commencement, June 17th, 1903.

George Henry Müller, ... Atlantic City, N. J.
Oration.

Chester Timothy Brown, ... Atlantic City, N. J.
Third Scientific Honor.

Frank Stelle Booth, ... Yokohama, Japan.
Rhetorical Honor.

Austin Wakeman Scott, ... New Brunswick, N. J.
First Classical Honor.

Cortlandt Haydock Bonney, ... Rahway, N. J.
Second Scientific Honor.

Harry Riley Lee, ... New Brunswick, N. J.
First Scientific Honor.

*Frank Stelle Booth, ... Yokohama, Japan.
Third Classical Honor.

Eugene William Erler, ... Newark, N. J.
Second Classical Honor.

William Carter, ... Fieldsboro, N. J.
Oration.

*Excused on account of delivering the Rhetorical Honor Oration.

4. HONORS IN SPECIAL SUBJECTS.

CLASSICAL SCHOOL.

In History, ... Austin Wakeman Scott.
In German, ... Frank Stelle Booth.
In Mathematics, ... Austin Wakeman Scott.

SCIENTIFIC SCHOOL.

In Chemistry, ... Harry Riley Lee.
In Electricity, ... William Lee Tharp.
In Mathematics, ... George Henry Müller.

5. DEGREES CONFERRED.

Degree of Bachelor of Arts Conferred on Candidates in Course.

Frank Stelle Booth,
Merton Whitcomb Davis,
Eugene William Erler,
James Wallace Hageman,
Burton James Hotaling,
Howard Franklin Kirk,
Stephen St. John Malven,
Ralph Crosby Morris,
Robert Hude Neilson,
Austin Wakeman Scott,
Frank Edward Spring.

Degree of Bachelor of Science Conferred on Candidates in Course.

Daniel Herbert Applegate, Jr.,
Raymond Harman-Ashley,
Cortlandt Haydock Bonney,
Chester Timothy Brown,
William Carter,
George Washington Conover,
David Raymond Edgar,
Maurice Cope Engle,
William Asbury Fisher,
Stephen Jósiah Gould Francisco,
Carl Morse Herbert,
Wright Sammis Hoag,
Ernest Daniel Jones,
John Earl Jones,
Harry Riley Lee,
William Fontaine Little,
Allen Sylvanus Merchant,
George Henry Müller,
Earle Julien Owen,
Robert Haven Reineck,
Fred Conrad Schneider,
Arthur Embury Smith,
Paul Strassburger,
William Lee Tharp,
Theodore Tobish,
Stewart Le Roy Tweed,
John Marshall Van De Venter,
Percy Lyle Van Nuis,
Otto Robert Andree Voelker,
Ralph Baldwin Wilcox.

Degree of Master of Arts Conferred.

Clarence Edwards Case, '00,
Frank Eckerson, '00,
Stetson Pratt Hardenbergh, '00,
Marinus Seymour Purdy, '00.

Degree of Master of Science Conferred.

Mount De Bow Gravatt, '94,
David Layton, '94,
John Garretson Blackwell, '95,
John Mahlon Mills, '97,
Laurance Phillips Runyon, '99.

Degree of Civil Engineer Conferred.

Louis Ulrich Strassburger.

Degree of Bachelor of Divinity Conferred.

GARRET HONDELINK.

Honorary Degrees Conferred.

A.M.	RALPH VOORHEES,	Clinton, N. J.
A.M.	LEWIS CALDWELL WOOLEY,	Trenton, N. J.
C.E.	GEORGE WILLIAM KUEHNLE,	New Brunswick, N. J.
C.E.	GEORGE MCCLELLAN TAYLOR,	Fort Hamilton, New York City.
Sc.D.	JOSEPH LAWRENCE HILLS,	Burlington, Vt.
D.D.	REV. JAN HENDRIK DE VRIES,	Princeton, N. J.
D.D.	REV. WILLIAM STOCKTON CRANMER,	Somerville, N. J.
D.D.	REV. JOHN TALLMADGE BERGEN,	Holland, Mich.
D.D.	REV. PHILIP HENRY COLE,	Syracuse, N. Y.
L.H.D.	HENRY RUTGERS MARSHALL,	New York City.
LL.D.	HON. ALPHONSO TRUMBOUR CLEARWATER,	Kingston, N. Y.
LL.D.	CHARLES NORMAN ELLINWOOD, M.D.,	San Francisco, Cal.

6. PRIZES AWARDED.

SENIOR PRIZES.

Suydam Prize for Composition,		FRANK STELLE BOOTH.
Bradley Mathematical Prize,		GEORGE HENRY MÜLLER.
Appleton Memorial Prize in Moral Philosophy,		JAMES WALLACE HAGEMAN.
Bowser Engineering Thesis Prize,		ROBERT HAVEN REINECK.
Bussing Prizes for Extempore Speaking,	First,	BURTON JAMES HOTALING.
	Second,	AUSTIN WAKEMAN SCOTT.
Class of 1876 Political Philosophy Prize,		AUSTIN WAKEMAN SCOTT.
Class of 1866 Electrical Science Prize,		WILLIAM LEE THARP.
Classical Prize in Logic,		EUGENE WILLIAM ERLER. AUSTIN WAKEMAN SCOTT.
Scientific Prize in Logic,		RAYMOND HARMAN-ASHLEY.

JUNIOR PRIZES.

John Parker Winner Memorial Prize in Mental Philosophy,	HENRY DYER COOK.
Ralph N. Perlee Junior Orator Prize,	MARTIN LUTHER SCHENCK.

SOPHOMORE PRIZES.

Myron W. Smith Memorial Prizes for Declamation,	First,	WELCOME WILLIAM BENDER.
	Second,	HARRY BAREMORE ANGUS.
Peter Spader Prizes in Modern History,	First,	FRANK NICHOLS JENNINGS.
	Second,	WELCOME WILLIAM BENDER.

FRESHMAN PRIZES.

Tunis Quick English Grammar and Spelling Prize,		Arthur Headifen Howatt.
Sloan Classical Entrance Examination Prizes,	First,	John Marius Madison Stahr.
	Second,	Louis Bevier, 3d.
Barbour Prizes in Speaking,	First,	Raymond Berguer Johnson.
	Second,	Maurice Irving Lindrith Kain.

GENERAL PRIZES.

Van Vechten Prize for Essay on Foreign Missions,		Simon Blocker.
Van Doren Mission Essay Prize,		Henry John Vyverberg.
Luther Laflin Memorial Prizes in Metaphysics,	First,	Frank Stelle Booth.
	Second,	Henry Dyer Cook.
		Martin Luther Schenck.
Bradley Prize in Roman Law,		Louis Williamson Conover.

7. HONORABLE MENTION.

Harry Riley Lee, Class of 1903, for work done and examinations passed in French, as follows:

Le Conscrit, Erckmann-Chatrian, Siège de Paris, Francisque Sarcey,
Waterloo, Erckmann-Chatrian, Ruy Blas, Victor Hugo.

Louis Bevier, 3d, Class of 1906, for work done and examinations passed in Latin, as follows:

Horace, Odes, Books I., II., III.

8. RUTGERS CORPS CADETS.

COMMANDANT.

SAMUEL E. SMILEY,
Captain Fifteenth U. S. Infantry.

FIELD AND STAFF.

Cadet Major,	T. E. Van Winkle.
Cadet First Lieutenant and Adjutant,	H. B. Osborn.
Cadet First Lieutenant, Quartermaster and Commissary,	H. A. Plusch.

NON-COMMISSIONED STAFF.

Cadet Sergeant-Major,	D. T. Mason.
Cadet Quartermaster and Commissary Sergeant,	E. J. Pearce.

COMPANY A.	COMPANY B.	COMPANY C.
	Cadet Captains.	
F. A. Price, Jr.	F. C. Volkert.	J. B. Brown.
	Cadet First Lieutenants.	
C. F. O'Neill.	F. W. Gaston.	S. C. Garrison.
	Cadet Second Lieutenants.	
M. S. Ley.	G. A. Mount.	J. Mellor.
	Cadet First Sergeants.	
C. A. Morris.	A. V. De Hart.	G. R. Koehler.
	Cadet Sergeants.	
F. E. Holsten,	E. W. Seng,	R. W. Cobb,
G. B. Ford,	E. J. Davis,	D. C. Roberts,
W. P. Morton.	W. B. Roll.	J. Gaub.
	Cadet Corporals.	
H. K. Doane,	H. M. Fales, Jr.,	T. A. Devan,
C. S. Brinkerhoff,	A. W. Hill,	F. O. Mittag, Jr.,
A. Brogger,	F. N. Wardwell,	R. W. Allen,
G. O. Smalley,	P. V. Van Arsdale.	W. H. Benedict, Jr.
B. B. Staats, Jr.		

COLOR GUARD.

Cadet Color Sergeants, ... H. B. Angus and I. R. Valentine.
Cadet Privates, ... F. C. Wittig and C. Wagner.

FIELD MUSIC.

Cadet Chief Musician, ... H. W. Moore.
Cadet Principal Musicians, ... R. Heuser and W. J. Douglas, Jr.

DISTINGUISHED STUDENTS IN THE MILITARY DEPARTMENT.

In accordance with the orders of the War Department, on the graduation of every class the names of such students as have shown special aptitude for military service will be reported to the Adjutant-General of the Army and to the Adjutant-General of New Jersey, and the names of the three most distinguished students in Military Science and Tactics will be inserted in the United States Army Register and published in general orders.

The names of the students in the Class of 1903 who were so reported to the Adjutant-General of the Army and to the Adjutant-General of New Jersey, and whose names will appear in the Army Register for 1904, are:

Cadet Major. . . . . PERCY LYLE VAN NUIS.
Cadet Captain, ... DAVID RAYMOND EDGAR.
Cadet First Lieutenant and Adjutant, . . . HARRY RILEY LEE.

9. STANDING COMMITTEES OF THE BOARD OF TRUSTEES.

The President is *ex officio* a Member of all Committees.

Finance—ROBERT F. BALLANTINE, ESQ., Chairman.
Instruction and Discipline—REV. EDWARD B. COE, D.D., LL.D., Chairman.
College Experiment Station—THE PRESIDENT, Chairman.
College Farm—WILLIAM H. LEUPP, ESQ., Chairman.
Preparatory School—REV. PROFESSOR WILLIAM H. S. DEMAREST, D.D., Chairman.
Properties—HENRY L. JANEWAY, ESQ., Chairman.
Library—REV. RODERICK TERRY, D.D., Chairman.
Honorary Degrees—HON. HENRY W. BOOKSTAVER, LL.D., Chairman.
Trustees—REV. JOHN B. DRURY, D.D., Chairman.
Beneficiary Trusts—REV. PROFESSOR J. PRESTON SEARLE, D.D., Chairman.
Advisory—THE PRESIDENT, Chairman.
Ceramic Department—WILLIAM H. LEUPP, ESQ., Chairman.

10. STANDING COMMITTEES OF THE FACULTY.

The President is *ex officio* a Member of all Committees.

Alumni Interests—PROFESSORS VAN DYCK, PRENTISS, MR. PARMELEE.
Athletics—PROFESSOR BEVIER, MR. DODGE, CAPTAIN SMILEY.
Catalogue—PROFESSORS DAVIS, BREAZEALE, MR. DE REGT.
Curriculum—PROFESSORS KIRK, PAYSON, SPEYERS.
Employment of Students—PROFESSORS TITSWORTH, SMITH, MR. UPSON.
Extension Work—PROFESSORS SMITH, BEVIER, MR. PARMELEE.
Graduate Degrees—PROFESSORS VAN DYCK, NELSON, MR. THOMPSON.
Gymnasium—PROFESSOR BEVIER, MR. DODGE, CAPTAIN SMILEY.
Library—MR. UPSON, PROFESSOR HART, MR. NEAL.
Music—PROFESSOR DAVIS, MR. BABBITT, MR. GEORGE.
Relations to Preparatory Schools—PROFESSORS STEVENSON, BEVIER, PAYSON.
Press—PROFESSORS VOORHEES, DAVIS, MR. BARBOUR.

11. STUDENT SELF-GOVERNMENT COMMITTEE, 1903-1904.

Dean F. C. Van Dyck, *ex officio*.

George W. Bauer, Jr., '04.
John A. Linnett, '04.
Bertram F. Shivler, '04.
James C. Waters, Jr., '04.
Charles H. Connors, '06.
William H. Woodruff, '06.
Robert W. Cobb, '05.
John E. Pearce, '05.
Albert A. Taylor, Jr., '05.
Irving R. Valentine, '05.
Max Hemmer, Jr., '07.
F. Granger Lang, '07.

12. THE ASSOCIATION OF THE ALUMNI OF RUTGERS COLLEGE.

President, ... *John S. Voorhees, '76.

Vice Presidents, ...
- Holmes V. M. Dennis, '69.
- Hon. Louis H. Schenck, '74.
- J. Waterbury Scudder, '83.
- Rev. Oscar M. Voorhees, '88.

Secretary, ... W. Edwin Florance, '85.

Treasurer, ... Irving S. Upson, '81.

Orator Primarius, . . . Hon. Jonathan Dixon, LL.D., '59.

Orator Secundus, ... Rev. William P. Bruce, '84.

Biographer, ... Irving S. Upson, '81.

Alumni Trustee Nominating Committee, ...
- Rev. William H. De Hart, D.D., '65.
- John DeW. Peltz, '73.
- W. Edwin Florance, '85.

Chief Inspector of Election of Alumni Trustee, . . . Professor A. A. Titsworth, C.E., '77.

Assistant Inspectors, ...
- Irving Hoagland, '90.
- Rev. Edward V. V. Searle, '91.

Permanent Chairman of the Standing Committee, . . . Professor Louis Bevier, Jr., Ph.D., '78.

Standing Committee, ...

W. Edwin Florance, '85, Secretary *ex officio*.
Irving S. Upson, '81, Treasurer *ex officio*.

	Term Expires.
John N. Carpender, '66,	June, 1904.
John A. Miller, '71,	June, 1904.
W. H. Van Steenbergh, '77,	June, 1904.
Robert B. Littell, '95,	June, 1904.
Jacob E. Ward, '75,	June, 1905.
Theodore Strong, '83,	June, 1905.
H. A. Smith, '87,	June, 1905.
Rev. John H. Raven, D.D., '91,	June, 1905.
Charles Bradley, '76,	June, 1906.
Prof. A. A. Titsworth, '77,	June, 1906.
T. B. Booraem, '81,	June, 1906.
Rev. Wm. S. Cranmer, D.D., '82,	June, 1906.

* Died March 2d, 1904.

13. THE RUTGERS COLLEGE ALUMNI ASSOCIATION OF THE CITY OF NEW YORK.

Organized 1892. Incorporated 1902. Annual meeting January, 1904.

OFFICERS.

President, ... John A. Miller, '71.
Vice President, ... *Clifford H. Strang, '91.
Secretary, ... Philip M. Brett, '92.
Treasurer, ... Frank A. Pattison, '87.

DIRECTORS.

For One Year.

Hon. Henry W. Bookstaver, '59. Louis W. Stotesbury, '90.
William S. Myers, '89.

For Two Years.

Professor Louis Bevier, Jr., '78. Warren A. Mayou, '90.

14. RUTGERS CLUB, 1903-1904.

Dinner Committee,
- Myron T. Scudder, '82, Presiding Officer.
- Rev. William H. Ten Eyck, D.D., '45.
- Richard Wynkoop, '49.
- Rev. Joachim Elmendorf, D.D., '50.
- Judge H. W. Bookstaver, LL.D., '59.
- Judge William H. Vredenburgh, '59.
- J. C. Pumpelly, '60.
- Stephen Fiske, '62.
- Judge Alfred Reed, LL.D., '62.
- Rev. Charles H. Pool, D.D., '63.
- Augustus Floyd, '65.
- John N. Carpender, '66.
- Haley Fiske, '71.
- Charles A. Runk, '74.
- David Murray, '76.
- Irving S. Upson, '81.
- Rev. William I. Chamberlain, '82.
- Rev. Henry E. Cobb, D.D., '84.
- Charles E. Pattison, '84.
- William S. Myers, F.C.S., '89.
- Dr. James Bishop, '91.
- Philip M. Brett, '92.
- Rev. Ellis Bishop, '92.
- Dr. Louis F. Bishop, '85, Secretary and Treasurer, 54 West Fifty-fifth street, New York.

* Died August 30th, 1903.

SPECIMEN ENTRANCE EXAMINATION PAPERS.

SPECIMEN ENTRANCE EXAMINATION PAPERS.

ALGEBRA.

1. Resolve into two factors $x^4 - 19x^2y^2 + 25y^4$.

2. Add $\frac{x^2 + y^2}{xy}$, $\frac{x^2}{xy + y^2}$, $\frac{y^2}{x^2 + xy}$.

3. Given $\frac{2x + 3a}{x + a} = \frac{2(3x + 2a)}{3x + a}$ to find x.

4. Given $\sqrt{x} - \sqrt{x - 8} = \frac{2}{\sqrt{x - 8}}$ to find x.

5. Given $x - y = 3$, $x^2 - 3xy + y^2 + 19 = 0$ to find x and y.

6. Given $x + y = 35$, $\sqrt[3]{x} + \sqrt[3]{y} = 5$ to find x and y.

7. Given $x + y = 5$, $4xy = 12 - x^2y^2$ to find x and y.

8. Find two numbers in the ratio of 5 to 6 and whose sum is 121.

9. How many terms of the series 24, 20, 16..... must be taken that the sum may be 72?

10. Insert 6 geometric means between 56 and $-\frac{7}{16}$.

PLANE GEOMETRY.

1. The diagonals of a parallelogram bisect each other.

2. The sum of the exterior angles of a polygon, made by producing each of its sides in the same direction, is equal to four right angles.

3. An inscribed angle is measured by one-half of the arc intercepted between its sides.

4. An angle formed by a tangent and a chord is measured by one-half the intercepted arc.

5. If two chords intersect each other in a circle their segments are reciprocally proportional.

6. If four quantities are in proportion, then like powers, or roots, are in proportion.

7. The area of a trapezoid is equal to one-half the sum of the parallel sides multiplied by the altitude.

8. Prove that the line joining the middle points of the parallel sides of a trapezoid divides the area into two equal parts.

9. Similar segments are to each other as the squares on their radii.

10. Find the side of a square equivalent to a circle whose radius is 40 feet.

SOLID GEOMETRY.

1. Every point in the plane which bisects a dihedral angle is equally distant from the faces of that angle.

2. The sum of any two face-angles of a triedral angle is greater than the third.

3. Define prism; right prism; truncated prism; parallelopiped; right parallelopiped; rectangular parallelopiped.

4. The lateral area of a prism is equal to the product of the perimeter of a right section by a lateral edge.

5. The volume of a triangular pyramid is equal to one-third of the product of its base and altitude.

6. Find, in square feet, the surface of a cubical cistern whose contents are 373,248 cubic inches.

7. The sum of the angles of a spherical triangle is greater than two, and less than six, right angles.

8. A lune is to the surface of the sphere as the angle of the lune is to four right angles.

9. Find the total area of a frustum of a cone of revolution, the radii of its bases being 9 and 4 feet and its height 12 feet.

10. Find the area of a spherical triangle each of whose angles is 70° on a sphere whose surface is 144 square inches.

UNITED STATES HISTORY.

1. What were the circumstances and ideas which especially gave encouragement to Columbus in his plans for a voyage westward to India?

2. What especial importance attaches to the voyages of Vespucci and Vasco da Gama?

3. Give an account of the settlements made under the London Company.

4. Write a brief sketch of the influence of the Quakers on political and social life in America.

5. How did Queen Anne's War affect the claims of England and France to territory in America?

6. Give five of the charges against the King of England enumerated in the Declaration of Independence.

7. Give an account of the acquisition of Louisiana territory.

8. What was the nature of the trouble between France and America between 1796 and 1800?

9. What was the nature of the Kansas-Nebraska struggle?

10. Write a brief sketch of the public services of Hamilton, Benton, Webster.

ENGLISH GRAMMAR AND LITERATURE.

1. Give the rules for the use of capitals.

2. Name and define the parts of speech.

3. What is (*a*) the gender of *sun, anger, war, nature, peace, ship, ox;* (*b*) the plural of *solo, valley, staff, penny, radius, court-martial, sheep?*

4. Give the list of pronouns. Inflect the simple personal pronouns of the third person.

5. Parse each word in the sentence, "Sir, the book was published in order to be sold."

6. Name ten marks of punctuation and explain briefly the use of each.

7. Which of the "books announced" have you (*a*) read, and (*b*) studied?

8. Milton's Lycidas: what kind of a poem; the occasion of it;

how does Milton show his Puritanism in it? Give the meaning of the words *hearse* and *rathe*.

9. Explain these quotations from Lycidas: (*a*) "Sisters of the Sacred Well;" (*b*) "Strictly meditate the thankless Muse;" (*c*) "The dear might of him that walked the waves;" (*d*) "The sun hath stretched out all the hills."

10. Write an essay (of about 150 words correctly spelled, punctuated and paragraphed) on "The First Two Chapters of 'The Vicar of Wakefield.'"

CHEMISTRY.

1. Distinguish Chemistry from Physics.
2. Describe preparation and properties of chlorine.
3. Describe the making of sulphuric acid. Draw apparatus.
4. Give Avogadro's hypothesis.
5. Complete the equation $NaCl + H_2SO_4 =$
6. How is copper obtained from its ores?
7. What is common soda? How is it prepared?
8. How is tin obtained from its ores?
9. How is aluminum obtained from its ores?
10. Name some important compounds of aluminum.

PHYSICS.

1. What is the unit of work, and the unit of power?
2. How is the advantage of a set of pulleys reckoned?
3. Does a body thrown upward come down as quickly as it goes up? Explain your answer.
4. What are the essentials of an air pump?
5. State the velocity of sound in air; and the effect of changes of temperature.
6. State some ways of magnetizing steel.
7. Explain the construction and operation of some electrical machine not containing magnets.
8. What are the items of an ordinary telegraph circuit?
9. How are the fixed points of a thermometer obtained?
10. State the facts and laws of boiling.

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